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A study to determine the effects of oral-aural teaching (intensive language instruction) techniques on pupils' gains in reading proficiency involved 1418 pupils. A sample of first graders and a sample of second graders were each subdivided into four groups. Group one was exposed to oral-aural teaching methods in English for the presentation of science materials. Group two was taught the same content in oral-aural Spanish. Group three received the science content without oral-aural methods, and the control group, representing a cross section of socioeconomic levels in contrast to the three disadvantaged groups, had neither the experimental science materials nor the oral-aural instruction. Pretest and posttest scores on reading achievement and intelligence for all groups provided data treated by analysis of covariance. Findings indicated no significant difference in the oral-aural method in the second grade. Results from the first grade rated the oral-aural English treatment as the most successful of all. A possible explanation of the difference in sample results may be that the first grade teachers had had a year's experience with the experimental methods and materials. The development of more appropriate evaluation instruments and additional study of the teacher variable are needed. Fourteen tables and a bibliography are included. Appendix A summarizes the statistical procedure, and Appendix B gives the study's statistical results. (MS)

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1965-66 (YEAR TWO) FINDINGS, SAN ANTONIO LANGUAGE RESEARCH PROJECT

THOMAS D. HORN, DIRECTOR

by Richard D. Arnold

The Research & Development Center
For Teacher Education

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THE UNIVERSITY OF TEXAS
AUSTIN

1965-66 (YEAR TWO) FINDINGS,
SAN ANTONIO LANGUAGE RESEARCH PROJECT
THOMAS D. HORN, DIRECTOR

by Richard D. Arnold

R & D Contract #OE 6-10-108

In cooperation with the Department of
Curriculum and Instruction, The University of
Texas at Austin, and the San Antonio
Independent School District

PS 001081

PREFACE

The San Antonio Language Research Project was supported during its second year of operation (1965-66) by funds from Title I sources and the Research and Development Center for Teacher Education, College of Education, The University of Texas at Austin. This analysis by Dr. Richard D. Arnold of the second year data was made possible by primary support by the Research and Development Center.

Thomas D. Horn
January, 1968

ACKNOWLEDGEMENTS

The tremendous scope of the San Antonio Project has involved numerous people with varied backgrounds, all of whom have contributed directly and indirectly to the efforts of producing this report. To all, the writer wishes to express his thanks.

Special thanks are extended to the administrators and teachers in the project schools who have handled so graciously the extensive testing program and who have waited so patiently for the Second Year findings.

The author wishes to express his appreciation to Thomas D. Horn whose assistance brought the work to fruition. The considerable efforts of Clinton Schuhmacher, in data analyses reflected throughout the paper and appendices, are especially appreciated.

Richard D. Arnold

December, 1967

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CHAPTER I

INTRODUCTION TO THE PROBLEM

According to the 1960 census, there are over 1.4 million people with Spanish surnames in Texas of which over 213,000 live in the city of San Antonio. The number increases each year. Many schools in the San Antonio Bilingual Teaching Project were composed almost exclusively of Spanish-speaking children. The socio-economic level of the families in the 11 census tracts comprising the project area schools is clearly low. The range of median incomes of the tracts is from $1,729 to $4,096 (McDowell, 1966).

The children in the San Antonio Project Schools frequently begin school with little or no command of the English language. Nevertheless, the language of instruction is English, and the difficulties which result are not surprising. Past records indicate that up to 80 per cent of Spanish-speaking children repeat first grade (Texas Education Agency, 1962). Failure for these children is common throughout the elementary school, and it is not unusual for children who are chronologically of junior and senior high school age to be found in the elementary school. These children usually leave school as soon as legally possible and sometimes before.

In an attempt to combat the failures and frustrations of these Spanish-speaking children, the San Antonio Bilingual Teaching Project was inaugurated in 1964 as one (United States Office of Education Cooperative Research Project #2648) of 27 first grade reading projects. The second year of this project was jointly funded by The University of Texas Research and Development Center and Title I funds of the San Antonio Independent School District. The present report deals only with the project's second year.

The objectives of the program were stated by Horn (1966a). Some of the most important are to:

(1) Provide alternative methods and materials in addition to those currently employed which might lessen the high rates of failure and drop-out.

(2) Create a more wholesome learning environment by changing teacher attitudes toward the Spanish-speaking pupil.

(3) Provide a research base to: (a) identify the forces affecting the academic achievement of the Spanish-speaking child, (b) analyze the role of oral language in the education of Mexican-American children, (c) evaluate the practicality of an educational program designed for Spanish-speaking pupils which would simultaneously develop cognitive and linguistic skills by using basic content areas as vehicles for language skill

development, and (d) identify those characteristics of teachers and children which would be most conducive to success in such a program.

(4) Develop and experimentally evaluate both in-service and pre-service programs of teacher education designed to achieve with maximum impact the previously listed objectives.

Specifically this report is concerned with the data gathered during the academic year, 1965-66. The general problem under study is: is differential growth in reading achievement obtained when children receive extensive and intensive oral language training?

Chapter II will deal with the procedures and design of the study and will list the specific hypotheses to be tested. Chapter III will contain the findings and conclusions. Chapter IV will be a summary of the study.

CHAPTER II

PROCEDURES

Location and Description of the Population

The purpose of this experiment was to identify and study a "most disadvantaged" group of Mexican-American children in Central Texas. A densely populated slum area in San Antonio was considered appropriate for the purpose. The San Antonio Independent School District cooperated in the selection of nine schools, all situated in close proximity. Each school qualified for and received considerable moneys from Title I and other supportive programs. Three important factors highlight a description of this population: low income, sub-standard housing, and lack of education.

Selection of Subjects

Two samples were involved in the study: Sample I consisting of students in the second grade; and Sample II consisting of students in the first grade. The children in Sample I were in the main those who had been in the research project during the first year of the study when they were first graders; a few, however, were in project classes in grade two only. The children were, insofar as possible, assigned to classes in which they would receive the same treatment as they had received the previous year. The total number of classes in Sample I was 33. Approximately 825 children were in the experimental treatments. An additional 12 classrooms were selected as a "Control" group. The "Control" classes were selected from various schools in the district and represented a cross-section of socio-economic levels and ethnic groups, thus deviating from usual control methodology. Approximately 300 children were in the "Control" group. Altogether, about 1125 children were in Sample I.

Sample II consisted of children in the first grade. The total number of classes in this sample was 30. Approximately 750 children were in this sample. An additional 12 classrooms were selected as a "Control" group. These classes, as for the Sample I "Control" group, were selected from various schools in the district and represented a cross-section of socio-economic levels and ethnic groups. Approximately 300 children were in this group. Altogether, about 1050 children were in Sample II. Table 1 summarizes the number of classes and subjects involved in the treatments for both samples for the second year.

The total number of classrooms involved during the secone year was 87, and the sample size was approximately 2175 students. Due to the high mobility of the families in the area and attrition due to loss of teachers and whole classrooms, the number of subjects on which both pre- and post-test

TABLE 1

TOTAL NUMBER OF CLASSES AND SUBJECTS, 1965-66 (YEAR TWO)
San Antonio Language Research Project

	Grade	NOA	OAS	OAE	"Control"	Total	Grand Total
Classes							
Sample I	2	11	10	12	12	45	
Sample II	1	11	7	12	12	42	87
Subjects*							
Sample I	2	275	250	300	300	1125	
Sample II	1	275	175	300	300	1050	2175

*Approximation based upon 25 pupils per class data were obtained was markedly smaller than the initial number of students in the sample. The total number of subjects for whom complete data are available was 783 for Sample I and 630 for Sample II. A tabulation of subjects by treatment can be seen in Table 2.

Content

Since language is a means to communicate ideas and has no inherent content, it was necessary to select content around which to form language for communication purposes. The content, A Process Approach to Science recently developed by the American Association for the Advancement of Science (AAAS), was the nucleus around which the oral-aural treatment was designed. This content was selected over other possible content areas because data informally analyzed had suggested that disadvantaged Spanish-speaking children did not find the content more difficult than did the more advantaged children. Only rarely will a child of any background have had extensive exposure to science concepts and the language of science before entering school. Also, the language of science tends to remain at the descriptive and objective level and is relatively free of the affective domain where differences in value systems and social systems may affect learning. Therefore, differences related to ethnic and socioeconomic groups were assumed to be at a minimum.

TABLE 2

NUMBER OF CLASSES AND SUBJECTS WITH COMPLETE DATA, 1965-66 (YEAR I
San Antonio Language Research Project

	Grade	NOA	OAS	OAE	"Control"	Total	Grand Total
Classes							
Sample I	2	11	10	12	12	45	87
Sample II	1	11	7	12	12	42	
Subjects							
Sample I	2	177	178	178	255	788	1418
Sample II	1	160	105	187	178	630	

Selected topics were used in both first and second grades. The teaching methods emphasized the "discovery approach" to teaching science, and many concrete, manipulative objects were used in the activities to enhance children's learning of new scientific concepts.

Language Component

After science was selected as the substantive content to be taught, the language relevant to the concepts was carefully considered. Since so many children were unable to speak English involving any content whatsoever, the primary purpose of the language component was to teach basic language structures within the framework of science content. Each science lesson was then carefully analyzed, and the language elements which were most likely needed to cope with the material were listed. Special lessons were then devised wherein a science concept and the language pattern were presented concomitantly to the child.

Techniques borrowed from the field of teaching English as a second language were utilized to give the children practice with the language patterns themselves. The practice exercises involved dialogues between the teacher and the children as they were working with their science materials. Many of the language patterns were a natural outgrowth of the science content. The use of full sentences was emphasized. Certain basic patterns and transformations were involved. For instance, a declarative statement was taught; then the related negative and interrogatory transformations were introduced. Substitutions into basic language pattern slots were used extensively. For example, once the labeling pattern, "This is a _______," was learned by the children, it was used repeatedly to teach other nouns representing objects.

The dialect problem resulting from speaking Spanish was considered important because of the social sanctions resulting from English spoken with a decided accent. However, this problem was conceived as being of secondary importance to learning English. As a result, emphasis was placed on the syntactical aspects of language and the phonological aspects were handled in an informal manner. When errors in pronunciation were made, help was given immediately. This phase was handled more incidentally than the program for the structured language patterns. When corrections were made, the teachers were careful to communicate in a constructive manner.

Treatment Groups

Project children were assigned to one of three different groups or to the "Control" group. The four groups were:

1. Oral-Aural English (OAE): Children were given intensive English language instruction using AAAS Science as the content vehicle.

2. Oral-Aural Spanish (OAS): Children were given intensive Spanish language instruction using AAAS Science as the content vehicle. This treatment group differs from the OAE group only in one respect, the language of instruction.
3. No Oral-Aural (NOA): Children were given instruction in the AAAS Science material in accordance with the procedures described in the teaching manual. No intensive language instruction was involved.
4. "Control": Children were given instruction according to the district curriculum guide. No special science or language programs were involved.

The OAE, OAS, and NOA groups received one hour of instruction each day, generally 30 minutes in the morning and 30 in the afternoon. The experimental period consisted of 140 teaching days.

Teacher Education

Individual classroom teachers were viewed as an important factor in the success of the experimental program. A major objective was to foster in the teachers an attitude of understanding and acceptance of disadvantaged Mexican-American children. A second major objective was to increase the skills and competencies utilized by the teachers in the experimental treatments.

To accomplish these objectives three aspects were included in the teacher education program. Many teachers attended National Defense Education Act (NDEA) summer institutes for teaching disadvantaged children staffed by Project personnel. Much of the content taught in the institutes was directly related to improving both teacher attitudes and skills. The teaching techniques employed in the San Antonio Project were a part of the curricular offering of The University of Texas NDEA Institute during the summers of 1964 and 1965.

An in-service education program was developed cooperatively with the San Antonio Independent School District. This program included a three-day pre-school workshop and regular monthly in-service meetings. The meetings involved lectures, demonstrations of methods and materials and the development of new materials. Part of the meetings were held for all project teachers together to discuss common topics. During the remainder of the meetings the teachers met according to their experimental treatment (OAE, OAS, and NOA) to discuss with their consultants topics unique to their treatment group.

The third aspect of the teacher education program was the regular consultative services provided by The University of Texas staff members. One consultant was assigned to each treatment group. Approximately half of the teachers were new to the project during the second year. All teachers received weekly visits from consultants, though the new teachers were given extra help as deemed appropriate. The role of the consultants was conceived as that of a "helping teacher" where the consultant not only observed in the classroom but also made specific suggestions, worked directly with the children in demonstrations, and encouraged the teachers.

Measures Used

Different sets of measures appropriate for each grade level were used on the two samples studied. Pre- and post-test measures of reading related skills were administered to each sample. Additionally, equivalent forms of one reading test were administered in English and Spanish. Finally, group intelligence tests were administered.

Table 3 shows the tests administered to each of the samples.

Design of the Study

The analyses to which the test scores were subjected were essentially comparisons of the scores achieved by OAE, OAS, NOA, and "Control" children. Simple comparisons of means, however, were deemed inappropriate because of substantial initial differences in both reading-related skills and intelligence (see tables 4 and 5). Since such differences

TABLE 3

TESTS ADMINISTERED
DURING 1965-66 (YEAR TWO)
San Antonio Language Research Project

SAMPLE I, SECOND GRADE

Testing Period	Level	Form	Test
Fall	Primary, Level 1 (P 1)	DE	Test of Reading, Inter-American Series (IAE)
Fall	Primario, Nivel 1 (P 1)	CEs	Prueba De Lectura, Serie Interamericana (IAS)
Fall	Primary, Level 1 (P 1)	A	Metropolitan Achievement Tests (MAT)
Fall	Scale 1	n.a.*	IPAT Culture Fair Intelligence Test
Spring	Primary, Level 2 (P 2)	DE	Test of Reading, Inter-American Series (IAE)
Spring	Primario, Nivel 2 (P 2)	CEs	Prueba De Lectura, Serie Interamericana (IAS)
Spring	Primary, Level 2 (P 2)	A	Metropolitan Achievement Tests (MAT)

*n.a.: not applicable

Table 3
page 2

SAMPLE II, SECOND GRADE

Testing Period	Level	Form	Test
Fall	n.a.*	n.a.	Brengelman-Manning Linguistic Capacity Index
Fall	n.a.	n.a.	Thurstone Pattern Copying Test
Fall	n.a.	n.a.	Goodenough-Harris Draw-A-Man Test
Fall	Primary, Level 1 (P 1)	DE	Inter-American Test of General Ability (IAE GA)
Fall	Primario, Nivel 1 (P 1)	CEs	Prueba De Habilidad General (IAS GA)
Spring	n.a.	n.a.	Brengelman-Manning Linguistic Capacity Index
Spring	Primary, Level 1 (P 1)	DE	Test of Reading, Inter-American Series (IAE)
Spring	Primario, Nivel 1 (P 1)	CEs	Prueba De Lectura-Series Interamericana (IAS)
Spring	n.a.	A	Metropolitan Readiness Tests (MRT)

*n.a.: not applicable

TABLE 4

MEANS AND STANDARD DEVIATIONS FOR FALL AND SPRING 1965-66 (YEAR TWO)
SAMPLE I, GRADE 2
San Antonio Language Research Project

	MEANS				STANDARD DEVIATIONS			
	NOA N=177	OAS N=178	OAE N=178	"Control" N=155	NOA N=177	OAS N=178	OAE N=178	"Contr N=15
Fall 1965								
Inter-American English, P-1								
Vocab.	17.37	15.14	14.80	20.20	5.74	6.28	5.82	6.65
Compre.	14.14	12.45	12.30	18.08	4.87	5.44	4.74	7.17
Total	31.51	27.64	27.08	38.17	9.80	11.00	9.62	12.96
Inter-American Spanish, P-1								
Vocab.	9.79	9.67	9.49		4.06	4.22	4.54	n.g.*
Compre.	7.74	7.75	7.41		3.37	3.27	3.21	n.g.
Total	17.54	17.35	16.90		6.39	6.66	6.47	n.g.
Metropolitan, P-1								
Word Knowledge	17.93	14.99	15.33		6.91	7.12	6.12	n.g.
Word Discrim.	16.37	13.85	13.42		7.28	7.47	6.70	n.g.
Reading	16.03	13.28	12.84		7.24	6.68	5.87	n.g.
Total	50.45	42.28	41.52		18.79	18.99	16.15	n.g.
IPAT, Scale 1								
Substitution	6.90	16.79	6.19	8.36	2.96	2.70	2.51	6.55
Mazes	4.33	3.50	3.83	7.48	3.75	3.79	3.67	3.85
Selecting N. O.	6.51	5.34	5.78	7.88	2.37	2.40	2.52	2.08
Similarity	9.18	8.83	8.94	9.76	1.96	2.53	2.24	1.87

*n.g.: not given

Table 4
Page 2

	MEANS				STANDARD DEVIATIONS			
	NOA N=177	OAS N=178	OAE N=178	"Control" N=155	NOA N=177	OAS N=178	OAE N=178	"Contro N=155
Spring 1966								
Inter-American English, P-2								
Level	19.12	15.83	15.96	20.32	5.92	4.74	5.04	6.49
Speed	9.27	8.06	7.83	10.81	4.46	3.22	3.47	5.25
Vocab.	19.89	17.06	16.85	23.85	6.20	5.27	5.04	7.16
Total	48.26	40.89	40.69	54.49	13.38	10.57	11.03	16.88
Inter-American Spanish, P-2								
Level	10.52	9.80	9.28		4.07	3.48	3.17	n.g.*
Speed	7.25	7.55	7.17		2.68	2.53	2.92	n.g.
Vocab.	10.41	10.58	10.02		3.25	3.36	3.04	n.g.
Total	28.12	27.91	26.52		6.76	6.45	5.86	n.g.
Metropolitan, P-2								
Word Knowledge	16.60	13.88	12.61	20.15	6.13	5.78	5.06	7.97
Word Discrim.	21.76	18.46	18.02	25.00	6.79	7.09	6.95	7.75
Reading	23.12	18.16	17.38	29.07	9.05	7.63	7.38	12.19
Total	61.50	50.38	49.24	74.56	18.23	17.97	20.81	26.71

*n.g.: not given

TABLE 5

MEANS AND STANDARD DEVIATIONS
FOR FALL AND SPRING
1965-66 (YEAR TWO) 1
Sample II, Grade 1
San Antonio Language Research Project

	MEANS				STANDARD DEVIATIONS			
	NOA N=160	OAS N=105	OAE N=187	"Control" N=178	NOA N=160	OAS N=105	OAE N=187	"Contro N=178
Fall 1965								
Inter-American Eng. General Ability, P-1								
Oral Vocab.	11.41	10.34	10.60	16.34	4.71	4.96	4.84	4.67
Number	5.24	4.74	4.93	7.66	3.28	3.19	3.20	3.10
Vocab. + Num.	16.58	15.09	15.53	24.06	7.39	7.74	7.53	7.16
Association	6.35	5.58	6.34	9.89	5.63	5.16	5.65	5.60
Classification	5.36	4.84	5.29	7.59	4.35	4.15	4.64	4.44
Asso. + Class.	11.71	10.42	11.63	17.45	9.49	8.50	9.64	8.88
Total	28.29	25.41	27.21	41.15	15.24	14.96	15.69	15.29
Inter-American Span. General Ability, P-1								
Oral Vocab.	10.03	10.38	10.99	n.g.*	4.58	4.15	4.13	n.g.*
Number	4.49	4.42	4.95	n.g.	3.26	2.98	3.01	n.g.
Vocab. + Num.	14.52	14.70	15.93	n.g.	7.18	6.43	6.38	n.g.
Association	5.69	5.82	7.16	n.g.	5.44	5.66	5.90	n.g.
Classification	5.06	4.89	5.81	n.g.	4.56	3.65	4.27	n.g.
Asso. + Class.	10.72	10.70	12.97	n.g.	9.29	8.32	9.44	n.g.
Total	25.34	25.50	28.91	n.g.	15.02	13.70	14.26	n.g.

*n.g.: not given

Table 5
Page 2

	MEANS				STANDARD DEVIATIONS			
	NOA N=160	OAS N=105	OAE N=187	"Control" N=178	NOA N=160	OAS N=105	OAE N=137	"Control" N=178
Brengelman-Manning								
Vocab.	12.44	12.30	12.47	n.g.*	4.36	4.31	4.45	n.g.
Cont. Phon.	8.77	8.10	8.46	n.g.	3.11	3.47	3.57	n.g.
Cont. Gram.	11.92	10.66	11.58	n.g.	4.29	4.92	4.79	n.g.
Total	33.04	31.14	32.52	n.g.	10.81	11.70	11.90	n.g.
Thurstone Pattern Copying	3.55	3.41	3.55	n.g.	1.46	1.37	1.42	n.g.
Goodenough-Harris								
Raw	14.29	13.95	13.19	n.g.	4.63	4.12	4.09	n.g.
Scaled	82.99	82.52	80.19	n.g.	20.86	21.33	21.77	n.g.
Spring 1966								
Brengelman-Manning								
Vocab.	17.40	16.91	17.50	n.g.	1.80	2.62	1.82	n.g.
Cont. Phon.	12.16	11.95	11.89	n.g.	2.51	2.78	2.34	n.g.
Cont. Gram.	16.82	16.09	16.70	n.g.	2.64	2.60	2.46	n.g.
Total	46.41	44.95	46.09	n.g.	5.75	6.90	5.36	n.g.
Inter-American English, P-1								
Vocab.	14.65	14.27	16.53	18.46	6.79	6.22	6.10	7.66
Comprehension	12.99	12.47	14.38	17.14	5.47	5.56	5.81	7.50
Total	27.64	26.73	30.97	35.46	11.41	10.34	10.81	14.09

*n.g.: not given

Table 5
Page 3

	MEANS				STANDARD DEVIATIONS			
	NOA N=160	OAS N=105	OAE N=187	"Control" N=178	NOA N=160	OAS N=105	OAE N=187	"Control" N=178
Inter-American Spanish, P-1								
Vocab.	11.71	12.08	11.86	n.g.*	4.20	4.93	3.60	n.g.
Comprehension	10.67	11.30	10.74	n.g.	2.85	4.24	3.43	n.g.
Total	22.40	23.33	22.71	n.g.	5.30	8.22	5.43	n.g.
Metropolitan Readiness								
Word Meaning	5.06	5.01	5.01	8.10	1.98	1.98	1.94	5.37
Listening	8.51	8.02	8.26	11.07	2.25	2.28	2.32	2.71
Matching	8.03	7.50	7.53	10.69	3.63	3.94	4.03	2.79
Alphabet	11.92	10.90	12.84	14.38	4.29	5.09	3.74	3.51
Numbers	12.17	11.90	12.61	13.74	3.67	4.13	3.99	6.40
Copying	5.66	4.54	5.45	7.77	2.06	2.71	2.21	4.28
Total	51.20	47.80	51.71	64.75	11.78	14.26	11.69	13.93

*n.g.: not given

were known to exist at the beginning of the school year, analysis of covariance (Bottenberg and Ward, 1963) was adopted because statistical controls could be introduced to "equate" the groups in terms of pre-test scores.

The task of comparing the treatment groups in terms of one variable while attempting to hold another constant is frequently complicated by the fact that superiority of one treatment over another may not be consistent across the range of scores under consideration. This is known as an interaction between treatment and covariates. It seemed reasonable to believe that the treatments designed specifically for disadvantaged Spanish-speaking children might be more effective for those at the low end of the over-all range considered. Similarly, it might be expected that the traditional program might be more effective for children who scored at the upper end of the range. It was deemed necessary, then, in attempting to evaluate the experimental treatments, to adopt an alternate form of analysis which could permit separate comparisons for high and low scores on the control variables.

The separate tests, however, were performed only in the Sample II (Grade 1) analyses of the Inter-American English (IAE) Test and the Metropolitan Readiness Test (MRT). In the other analyses there was too weak a relationship between the dependent and independent variables to warrant this procedure. Where separate high and low tests were conducted, the hypotheses involved are essentially the same as those stated at the conclusion of this chapter, the only difference being that, in this context, the hypotheses are to be regarded as applying differentially to children of high or low pre-test scores.

When it was found necessary to conduct separate analyses for high and low pre-test scores, the 15th and 85th percentiles were selected as the points at which comparisons were to be made. This choice was arbitrary, but it seemed reasonable since the objective was to compare the treatments at higher and lower values of the pre-test score range. The selection of more extreme points would, of course, become increasingly inappropriate since the comparisons would have to be made using scores which are infrequently achieved.

The procedures followed in these analyses are designed to test the null hypothesis that the post-test scores most typically associated with a given pre-test score are equal for all treatments. This hypothesis implies that the criterion-covariate regression lines for the various treatments must intersect at the pre-test score under consideration. The manner in which this implication was employed in testing for differences among the treatments is explained in Appendix A.

When differences between treatments were found to be constant throughout the range of the covariable, it was possible to test these differences for significance simultaneously over the entire range. The "group difference" tests which were conducted in this case were:

(1) OAE vs OAS;

(2) OAE and OAS pooled vs NOA;

(3) NOA vs "Control"

(4) OAE, OAS, and NOA pooled vs "Control"

In some cases, however, [particularly on the Inter-American Spanish Tests (IAS)], there were insufficient data for the so-called "Control" group so only tests (1) and (2) were performed. It is important to remember that the instruments which were available as criteria for comparing the treatments were subject to questions of validity for use with this particular pupil populations.

Hypotheses

The following list summarizes the hypotheses (stated in the null form) to which the study was directed:

Sample I (Grade 2)

(1) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their scores on the spring Inter-American English (IAE) P2 Level (comprehension) subtest when total scores on the Fall 1965 IAE P1 Reading Test are statistically controlled.

(2) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 Speed subtest when total scores on the Fall 1965 IAE P1 Reading Test are statistically controlled.

(3) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 Vocabulary subtest when total scores on the Fall 1965 IAE P1 Reading Test are statistically controlled.

(4) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 (total) when scores on the Fall 1965 IAE P1 Reading Test are statistically controlled.

(5) The NOA, OAE, OAS, and "Control" groups will not differ significantly on their spring scores on the Metropolitan Achievement (MAT) P2 Work Knowledge subtest when total scores on the Fall 1965 Institute for Personality and Ability Testing (IPAT) Intelligence Test are statistically controlled.

(6) The NOA, OAE, OAS, and "Control" groups will not differ signigicantly in their spring scores on the MAT P2 Word Discrimination subtest when total scores on the Fall 1965 IPAT Intelligence Test are statistically controlled.

(7) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MAT P2 Reading subtest when scores on the Fall 1965 IPAT Intelligence Test are statistically controlled.

(8) The NOA, OAE, OAS, and "Control" groups will not differ significantly on the MAT P2 (total) when scores on the Fall 1965 IPAT Intelligence Test are statistically controlled.

(9) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the MAT P2 Word Knowledge subtest when scores on the Fall 1965 MAT P1 Word Knowledge subtest are statistically controlled.

(10) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the MAT P2 Word Discrimination subtest when scores on the Fall 1965 MAT P1 Word Discrimination subtest are statistically controlled.

(11) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the MAT P2 Reading subtest when scores on the Fall 1965 MAT P1 Reading subtest are statistically controlled.

(12) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the MAT P2 (total) when total scores on the Fall 1965 MAT P1 are statistically controlled.

(13) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P2 Level (comprehension) subtest when total scores on the Fall 1965 IAS P1 Reading Test are statistically controlled.

(14) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P2 Speed subtest when total scores on the Fall 1965 IAS P1 Reading Test are statistically controlled.

(15) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P2 Vocabulary subtest when total scores on the Fall 1965 IAS P1 Reading Test are statistically controlled.

(16) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P2 (total) when total scores on the Fall 1965 IAS P1 Reading Test are statistically controlled.

(17) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the

IAE P2 Level (comprehension) subtest when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(18) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 Speed subtest when total scores onn the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(19) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 Vocabulary subtest when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(20) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P2 (total) when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(21) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MAT P2 Word Knowledge subtest when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(22) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MAT P2 Word Discrimination subtest when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(23) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MAT P2 Reading subtest when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

(24) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MAT P2 (total) when total scores on the Fall 1965 IAE P1 Reading Test and the IPAT Intelligence Test are statistically controlled.

Sample II (Grade 1):

(25) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P1 Vocabulary subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(26) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P1 Comprehension subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(27) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the IAE P1 Reading test (total) when total scores on the Fall 1965 IAE GA are statistically controlled.

(28) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the Metropolitan Readiness (MRT) Word Meaning subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(29) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT Listening subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(30) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT Matching subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(31) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT Alphabet subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(32) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT Numbers subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(33) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT Copying subtest when total scores on the Fall 1965 IAE GA are statistically controlled.

(34) The NOA, OAE, OAS, and "Control" groups will not differ significantly in their spring scores on the MRT (total) when total scores on the Fall 1965 IAE GA are statistically controlled.

(35) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P1 Vocabulary subtest when total scores on the Fall 1965 IAS GA are statistically controlled.

(36) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P1 Comprehension subtest when total scores on the Fall 1965 IAS GA are statistically controlled.

(37) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the IAS P1 Reading Test (total) when total scores on the Fall 1965 IAS GA are statistically controlled.

(38) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the Brengelman-Manning (BM) Vocabulary subtest when Fall 1965 scores on the BM subtest are statistically controlled.

(39) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the BM Contrastive Phonology subtest when Fall 1965 scores on the BM Contrastive Phonology subtest are statistically controlled.

(40) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the BM Contrastive Grammar subtest when scores on the Fall 1965 BM contrastive Grammar subtest are statistically controlled.

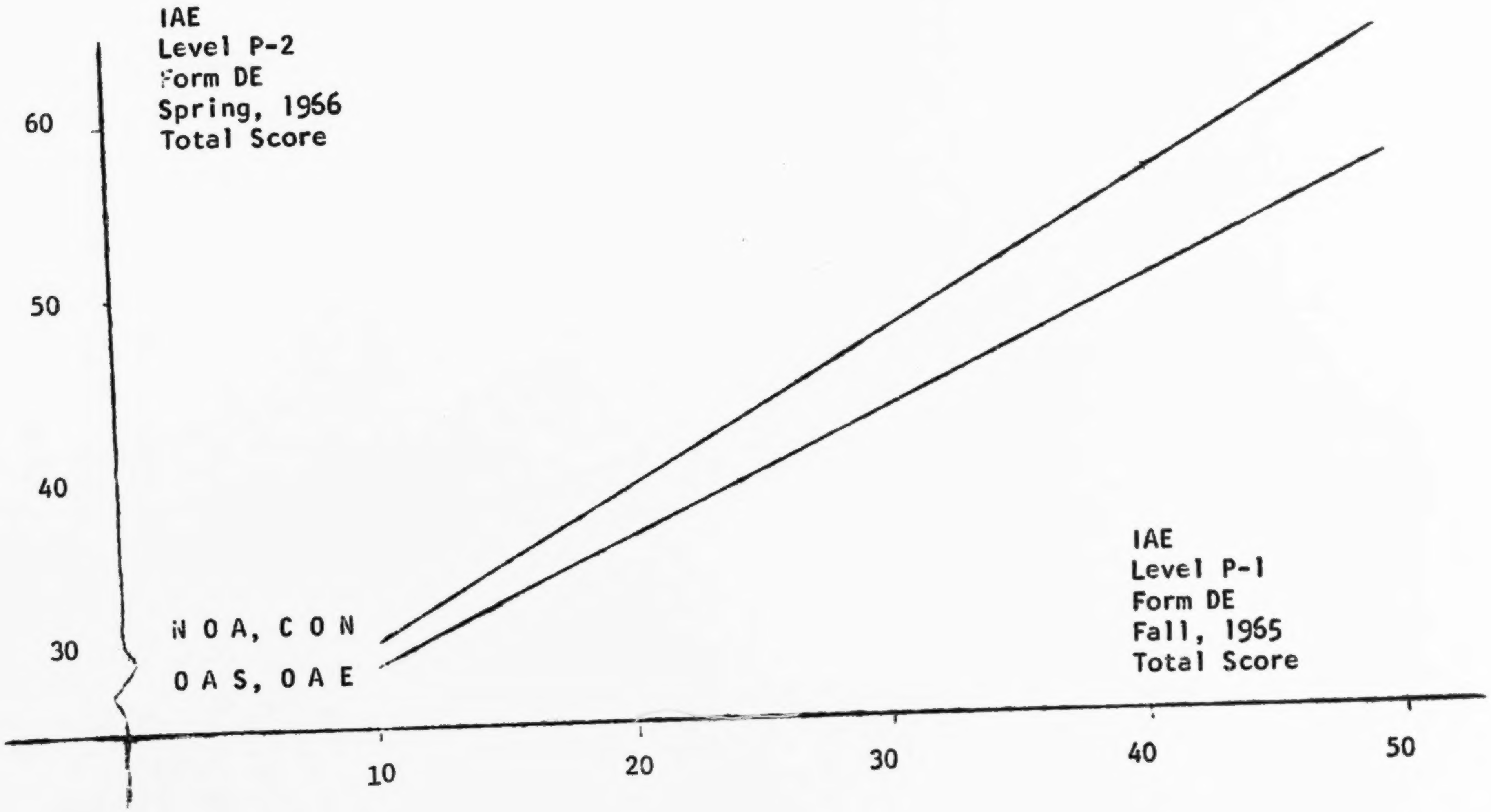
(41) The NOA, OAE, and OAS groups will not differ significantly in their spring scores on the BM test (total) when total scores on the Fall 1965 BM are statistically controlled.

Limitations

Some limitations to the experimental program were known to exist and affect the interpretations of the findings of the study. Differences existed in the teaching of the OAE

Figure 1

Relationship Between Inter-American English Test (Fall, 1965)
and Inter-American English Test (Spring, 1966)
San Antonio Language Research Project
Sample 1, Grade 2



and OAS classes chiefly because most of the available books and materials were written in English. This unfortunate factor did not enhance maximum learning potential for the Spanish language group. Virtually the only reading material for these children was teacher-made experience charts.

The scarcity of bilingual teachers necessitated a disproportionate number to be utilized in the Spanish treatment group. A possible problem in interpreting the data between treatment groups is that differences in treatments may also be associated with differences in teachers in terms of the presence and degree of bilingualism.

Sample I, Grade 2 children who were studied in this report were generally those who had received the experimental treatments in the first grade; however, some children were in the treatments during second grade only. This condition may tend to lessen differences between the experimental and "Control" treatments.

The administrative procedures involving the grouping of children varied from school to school. Grouping on such dimensions as chronological age, apparent language proficiency and other factors may reflect uncontrolled selective factors in the sample.

A further limitation may be the measures used. It is questionable whether the tests used (or indeed any tests) may be confidently applied to children with such a limited knowledge of English. Further, it appears doubtful that the tests used are measuring even indirectly the content being presented in the experimental treatments. The content validity of available standardized tests and their appropriateness as criteria are highly suspect in themselves.

Finally, the "Control" group used in the study was intended to be a representative sample of the entire San Antonio School District population. It was therefore strikingly different from the experimental groups in terms of socio-economic status, ethnicity, intelligence test scores, and level of language development. The analyses involving this group must be interpreted with the composition of the "Control" group in mind.

Summary

The primary purpose of this study was to determine whether a specially designed oral language program centered around AAAS science materials was effective with disadvantaged Mexican-American first and second grade children learning English as a second language.

The two samples consisted of children from a densely populated urban San Antonio, Texas area where the median family income is less than $3,000. Eighty-seven classes and 2,175 children were involved in the project and complete data were collected on 788 children in Sample I and 630 children in Sample II. The four treatments were:

(1) Oral-Aural English (OAE): Experimental language program taught in English using AAAS science materials.

(2) Oral-Aural Spanish (OAS): Experimental language program taught in Spanish using AAAS science materials.

(3) No Oral-Aural (NOA): AAAS science materials taught in English with the language arts program taught in accordance with the district curriculum guides.

(4) "Control": Science and language arts taught in English as prescribed by the district curriculum guides.

Measures of reading were the Metropolitan Achievement Test (MAT), Metropolitan Readiness Test (MRT), Inter-American Series Test of Reading (IAE), Serie Interamericana Prueba de Lectura (IAS), and the Brengleman-Manning (BM) Linguistic Capacity Index. Other measures used were the Institute for Personality and Ability Testing (IPAT) Culture Fair Intelligence Tests, Goodenough-Harris Draw-A-Man Tests, Interamerican Series Test of General Ability (IAE GA), Serie Interamericana Prueba de Habilidad General (IAS GA), and the Thurstone Pattern Copying Test. Analyses of covariance were used, and alternate high and low comparisons were conducted when interactions were present. Spring test scores were employed as criteria and fall test scores as covariates. The specific hypotheses for both Sample I and Sample II were presented. Possible limitations in the study concluded the chapter.

CHAPTER III

FINDINGS

Introduction

The primary aim of this chapter is to provide a concise and comprehensive presentation of the research findings. Many of the statistical details associated with the analyses have been omitted from this discussion. The reader who is interested in the technical details of the research may refer to the tables contained in Appendices A and B for a complete description of the procedures and results. The tables presented within this chapter, however, provide summary descriptions which should prove useful in interpreting the findings of the study.

Sample I (Grade 2) Analyses

Criterion: Spring 1966 IAE P2 Reading; Covariable: Fall 1965 IAE P1 Reading. In the analyses (Table 6) involving comparisons based upon the IAE, the Fall 1965 total test score of the IAE served as covariable. Analyses of the Level subtest, a measure of comprehension, of the IAE (line 1) yielded only

SUMMARY OF ANALYSES OF COVARIANCE OF INTER-AMERICAN ENGLISH RAEDING TEST, METROPOLITAN ACHIEVEMENT TESTS, AND THE INTER-AMERICAN SPANISH READING TEST, 1965-66 (YEAR TWO) SAMPLE I, GRADE 2
San Antonio Language Research Project

	Criterion Variable Spring 1966	Covariable Fall 1965	Equal Slope Hypothesis		OAE vs OAS		"C" vs NOA		OA* vs NOA		3 Gps vs "C"	
			p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.
1.	IAE Reading, P2 Level	IAE Rdg., P1 Total	.232	yes	.540	n.s.	.055	n.s.	.001	NOA>OA	.650	n.s.
2.	IAE Reading, P2 Speed	IAE Rdg., P1 Total	.019	no	n.a.		n.a.		n.a.		n.a.	
3.	IAE Reading, P2 Vocabulary	IAE Rdg. P1 Total	.151	yes	.999	n.s.	.001	"C">NOA	.001	NOA>OA	.001	"C">3Gps
4.	IAE Reading, P2 Total	IAE Rdg., P1 Total	.122	yes	.817	n.s.	.579	n.s.	.001	NOA>OA	.001	"C">3Gps
5.	MAT, P2 Wd. Know.	IPAT, S1 Total	.982	yes	.042	OAS>OAE	.002	"C">NOA	.001	NOA>OA	.001	"C">3Gps
6.	MAT, P2 Wd. Disc.	IPAT, S1 Total	.336	yes	.507	n.s.	.507	n.s.	.001	NOA>OA	.001	"C">3Gps
7.	MAT, P2 Reading	IPAT, S1 Total	.762	yes	.633	n.s.	.001	"C">NOA	.001	NOA>OA	.001	"C">3Gps
8.	MAT, P2 Total	IPAT, S1 Total	.982	yes	.540	n.s.	.001	"C">NOA	.001	NOA>OA	.001	"C">3Gps

*OA: Combined OAE and OAS n.a.: Not appropriate n.s.: Not significant

**: Not Given 3 Gps: Combined OAE, OAS, and NOA "C": Control

TABLE 6
- PAGE 2-

	Criterion Variable Spring 1966	Covariable Fall 1965	Equal Slope Hypothesis		OAE vs OAS		"C" vs NOA		OA* vs NOA		3 Gps vs "C"**	
			p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.
9.	MAT, P2 Wd. Know.	MAT, P1 Wd. Know	.589	yes	.004	OAS>OAE	n.g.		.001	NOA >OA	n.g.	
10.	MAT, P2 Wd. Disc.	MAT, P1 Wd. Disc.	.094	yes	.747	n.s.	n.g.		.001	NOA >OA	**	
11.	MAT, P2 Reading	MAT, P1 Reading	.849	yes	.503	n.s.	n.g.		.001	NOA> OA	**	
12.	MAT, P2 Total	MAT, P1 Total	.356	yes	.694	n.s.	n.g.		.001	NOA> OA	**	
13.	IAS Rdg., P2 Level	IAS Rdg., P1 Total	.009	no	n.a.		n.g.		n.a.		**	
14.	IAS Rdg., P2 Speed	IAS Rdg., P1 Total	.613	yes	.983	n.s.	n.g.		.932	n.s.	**	
15.	IAS Rdg., P2 Vocabulary	IAS Rdg., P1 Total	.027	no	n.a.		n.g.		n.a.		**	
16.	IAS Rdg., P2 Total	IAS Rdg., P1 Total	.025	no	n.a.		n.g.		n.a.		**	

* OA: Combined OAE and OAS   n.a.: Not appropriate   n.s.: Not significant

**: Not Given   3 Gps: Combined OAE, OAS, and NOA   "C": Control one significant difference. The NOA group was found to excel the combined OAE and OAS ($p < .001$).

Analyses of the Speed subtest of the IAE (line 2) showed a significant interaction ($p = .019$) among the treatments which prohibited further analyses.

Analyses of the Vocabulary subtest of the IAE (line 3) revealed the NOA treatment to be higher than the combined OAE and OAS treatments ($p < .001$) and the "Control" treatment to be higher than NOA ($p < .001$) and higher than the combined experimental treatments ($p < .001$).

When the total IAE test score (line 4) was the criterion, analyses revealed the NOA treatment to be higher than the combined OAE and OAS treatments ($p < .001$) and the "Control" treatment was higher than the combined experimental treatments ($p < .001$).

Figure 1 provides a graphic illustration of these results. With the IAE total test score as criterion and the IAE total test score as covariable, the line which describes the covariate-criterion relationship for the NOA group is virtually indistinguishable from the line describing that relationship for the "Control" group. The same is true of the OAE and OAS regression lines. The difference between the NOA-"Control" and OAE-OAS lines, however, is highly significant. The fact that the NOA-"Control" line is higher than the OAE-OAS throughout the range of the covariable indicates that the NOA and "Control" subjects generally achieved higher post-test scores than OAE and OAS pupils with similar pre-test scores.

Criterion; Spring 1966 MAT P2; Covariable: Fall 1965 IPAT S1 Total. Analyses (Table 6) for which the MAT served as criterion were conducted two times. The first used the IPAT Culture Fair Intelligence Test as covariate and the second time the covariate was each individual MAT subtest. The latter form of analysis normally would be preferable, but in this case it was deemed inadequate because sufficient pre-test data were not available for the "Control" subjects. Using the IPAT, however, it was possible to include all treatments in the analysis.

In the analyses (Table 6) involving comparisons based upon the MAT, the Fall 1965 total IPAT score served as covariable. Analyses of the Word Knowledge subtest (line 5) revealed the OAS treatment to be higher than the OAE treatment ($p = 042$), the NOA treatment higher than the OAE and OAS treatments ($p < .001$), the "Control" treatment higher than the NOA treatment ($p < .002$), and the "Control" treatment higher than the combined experimental treatments ($p < .001$).

Analyses of the Word Discrimination subtest (line 6) showed the NOA treatment to be higher than the combined OAE and OAS treatments ($p < .001$) and the "Control" treatment to be higher than the combined experimental treatments ($p < .001$).

On the Reading subtest (line 7) and the total test score (line 8), the NOA treatment was higher than the combined OAE-OAS treatments ($p < .001$), the "Control" treatment was higher than the NOA treatment ($p < .001$), and the "Control" treatment was higher than the combined experimental treatments ($p < .001$).

Criterion: Spring 1966 Individual MAT Subtests; Covariable: Fall 1965 Individual MAT Subtests. When the individual MAT subtests were used as covariates (lines 9 through 12), the results of the analyses (Table 6) were virtually identical to those described above. No results were available for the "Control" treatments because MATs were not administered to the "Control" subjects in the Fall of 1965.

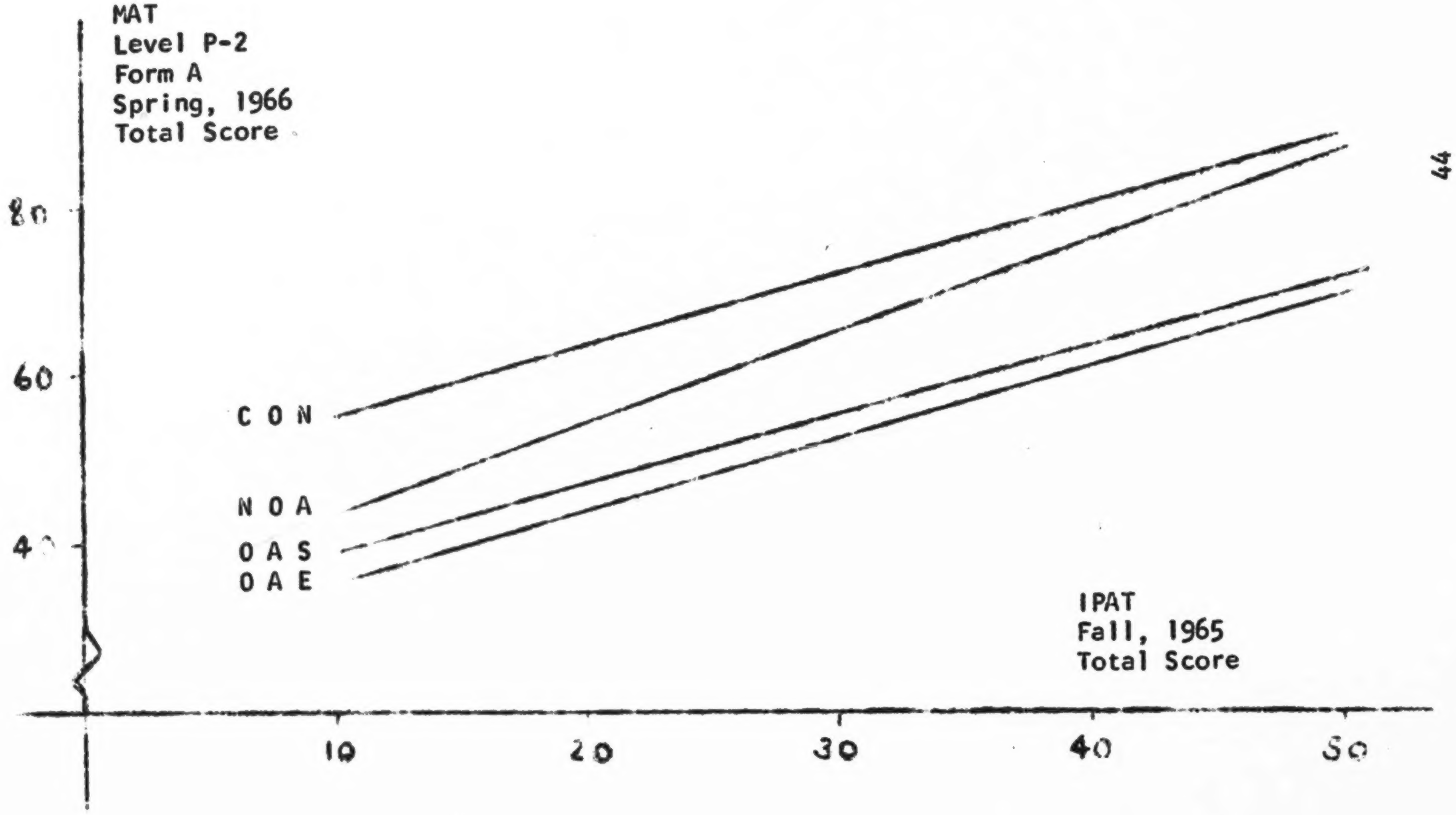
Figure 2 illustrates the relationship between the MAT total scores and the IPAT for each of the treatments. A graph based upon the analyses by the subtests would be very similar except that the line for the "Control" group would not appear and the scaling of the covariate axis would differ. Furthermore, the consistency of the results across the MAT subtests is such that the figure provides a fairly accurate illustration of the analyses of the subtests as well as the total score analysis. The same is true, incidentally, of the IAE Reading Test analyses illustrated in Figure 1.

Criterion: Spring 1966 Individual Subtests IAS P2 Reading; Covariable: Fall 1965 Total IAS P1 Reading. Analyses of covariance (Table 6) were performed using total scores on the IAS Test as covariables (lines 13 through 16). The analyses revealed significant treatment-covariate interaction, thus prohibiting the usual subsequent analysis on two of the three subtests and on the total score. The Speed subtest (line 14) revealed no significant differences among the treatments ($p = .983$ and $p = .932$).

It is of course impossible, when performing covariance analyses, to control *all* the variables upon which there might be initial differences among the treatments. In order to test the adequacy of the single-covariate design, the analyses involving the IAE and Metropolitan subtests were repeated with controls introduced for Fall (1965) scores on both the IAE and IPAT. The results of these analyses (presented in Tables 7 and 8) correspond very precisely to the findings of

Figure 2

Relationship Between Metropolitan Achievement Test (Spring,1966)
and IPAT Culture Fair Intelligence Test (Fall, 1965)
San Antonio Language Research Project
Sample 1, Grade 2



the single-covariate analyses presented earlier. Since the information provided by the simpler analyses was virtually unaffected by the inclusion of an additional control variable, there seemed to be little justification for the increased complexity of the multiple-covariate design. None of the subsequent analyses, therefore, employed more than one covariable.

Sample II (Grade 1) Analyses

The results to be reported in the remainder of the chapter pertain to analyses performed with data from Sample II (first grade) children. The statistical techniques employed in these analyses were the same as those used for the Sample I data except that, in some cases, it was impossible to obtain definitive results from those procedures. It was, therefore, necessary to extend the analyses as described in Chapter II and Appendix A.

Criterion: Spring 1966 IAS P1 Reading Individual Subtests, Covariable: Fall 1965 IAS P1 General Ability Total. In the analyses (Table 9) involving comparisons based on the IAS Test of Reading, the Fall 1965 IAS GA total test score served as the covariable. The three analyses (lines 1 through 3) revealed no significant differences among the treatments.

Criterion: Spring 1966 BM Individual Subtests; Covariable: Fall 1965 BM Individual Subtests. In the analyses (Table 9) involving comparisons based upon the BM Linguistic Capacity subtests, the Fall 1965 comparable subtests of the BM served as covariable. The Vocabulary and Contrastive Phonology subtests (lines 4 and 5) yielded significant treatment-covariate interaction prohibiting the usual subsequent analyses.

When the Contrastive Grammar subtest (line 6) was analyzed, no significant differences were found among the treatments.

Analyses of the total BM test (line 7) revealed no significant differences between the OAE and OAS treatments, and between the NOA and OAE treatments. Significant differences were found between the OAS and NOA treatments with the NOA treatment being higher ($p = .049$).

High-Low Analyses. Criterion: Spring, 1966 BM Individual Subtests; Covariable: Fall 1965 BM Individual Subtests. Since significant interactions were detected in the BM analyses, the data were analyzed separately for high and low pre-test scores.

When comparisons were made among pupils with low pretest scores (Table 10) on the BM Vocabulary subtest (line 1),

TABLE 7

SUMMARY OF DOUBLE COVARIANCE ANALYSES OF INTER-AMERICAN ENGLISH READING TEST, 1965-66 (YEAR TWO), SAMPLE I, GRADE 2
San Antonio Language Research Project

Criterion Variable Spring 1966	Covariable Fall 1965	Covariable Intelligence Fall 1965	Covariate Interaction		Achieve. Test Equal Slope Hypotheses		Intell. Test Equal Slope Hypotheses		OAE vs OAS		"Cont." vs NOA		OA* vs NOA		3 Gps vs "Cont."	
			p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.
IAE, P2 Level	IAE. P1 Level	IPAT Total	.588	no	.272	yes	.774	yes	.586	n.s.	.007	NOA>"Cont."	.001	NOA>OA	.001	3 Gps>"Cont."
IAE, P2 Speed	IAE, P1 Speed	IPAT Total	.028	yes	n.a.		n.a.		n.a.		n.a.		n.a.		n.a.	
IAE, P2 Vocab.	IAE, P1 Vocab.	IPAT Total	.999	no	.294	yes	.162	yes	.910	n.s.	.008	"Cont.">NOA	.006	NOA>OA	.001	"Cont.">3 Gps
IAE, P2 Total	IAE, P1 Total	IPAT Total	.999	no	.265	yes	.369	yes	.862	n.s.	.883	n.s.	.001	NOA>OA	.001	"Cont.">3 Gps

*OA: Combined OAE and OAS
n.a.: Not appropriate
n.s.: Not significant

TABLE 8

SUMMARY OF DOUBLE COVARIANCE ANALYSES OF METROPOLITAN ACHIEVEMENT TESTS, 1965-66 (YEAR TWO), SAMPLE I, GRADE
San Antonio Language Research Project

Criterion Variable Spring '66	Covariable Fall '65	Covariable Intelligence Fall '65	Covariate Interaction p	Covariate Interaction Interp.	Equal Slope IPAT p	Equal Slope IPAT Interp.	Equal Slope MAT p	Equal Slope MAT Interp.	OAE vs OAS p	OAE vs OAS Interp.	OA* vs NOA p	OA* vs NOA Interp.
MAT,P2 Wd. Know.	MAT,P1 Wd. Know	IPAT Total	.999	no	.999	yes	.335	yes	.003	OAS >OAE	.001	NOA>OA
Mat, P2 Wd. Disc.	MAT, P1 Wd. Disc.	IPAT Total	.600	no	.726	yes	.076	yes	.712	n.s.	.001	NOA>OA
MAT, P2 Reading	MAT, P1 Reading	IPAT Total	.957	no	.861	yes	.895	yes	.556	n.s.	.001	NOA>OA
MAT, P2 Total	MAT, P1 Total	IPAT Total	.999	no	.506	yes	.288	yes	.662	n.s.	.001	NOA>OA

* OA:	Combined OAE and OAS
n.a.:	Not appropriate
n.s.:	Not significant

TABLE 9

SUMMARY OF ANALYSES OF COVARIANCE OF INTER-AMERICAN SPANISH READING TEST AND THE BRENGELMAN-MANNING LINGUISTIC CAPACITY INDEX
1965-66 (YEAR TWO), SAMPLE II, GRADE 1
San Antonio Language Research Project

	Criterion Variable Spring 1966	Covariable Fall 1965	Equal Slope Hypothesis p	Interp.	NOA vs OAS p	Interp.	NOA vs OAE p	Interp.	OAS vs OAE p	Interp.
1.	IAS Reading Pl Vocabulary	IASGA Pl Tot.	.871	yes	.502	n.s.	.883	n.s.	.589	n.s.
2.	IAS Reading Pl Comprehension	IASGA Pl Tot.	.370	yes	.146	n.s.	.900	n.s.	.166	n.s.
3.	IAS Reading Pl Total	IASGA Pl Tot.	.959	yes	.227	n.s.	.922	n.s.	.249	n.s.
4.	B-M Vocabulary	B-M Vocabulary	.001	no	n.a.		n.a.		n.a.	
5.	B-M Con Phon	B-M Con Phon	.010	no	n.a.		n.a.		n.a.	
6.	B-M Con Gram	B-M Con Gram	.600	yes	.131	n.s.	.134	n.s.	.562	n.s.
7.	B-M Total	B-M Total	.118	yes	.049	NOA> OAS	.092	n.s.	.566	n.s.

n.s.: Not significant
n.a.: Not appropriate

the OAE treatment was found to be significantly higher than the OAS treatment (p = .032); no other comparison was found to be significant.

When comparisons were made among pupils with low pre-test scores on the BM Contrastive Phonology subtest (line 2), the NOA treatment was significantly higher than the OAE treatment (p = .048); no other significant comparison was found.

When comparisons were made among pupils with low pre-test scores on the BM Contrastive Grammar subtest (line 3), no significant differences were found among the treatments.

When comparisons were made among pupils with low pre-test scores on the BM total test score (line 4), the NOA treatment was significantly higher than OAS (p = .030); no other significant comparison was obtained.

When pupils with high pre-test scores were compared on the four BM scores (lines 5 through 8), no significant differences were obtained.

Criterion: Spring 1966 IAE Reading Subtests; Covariable: Fall 1965 IAE GA Total Scores. The analyses which featured the IAE Reading subtests as criteria, employed the Fall 1965 IAE GA total score as a covariable (Table 11).

Figure 3 provides a graphic illustration of the results for the IAE Reading Level subtest. Figure 3 may be considered representative of the subtests as well as the total score. The analyses yielded significant treatment covariate interaction prohibiting the usual subsequent analyses. The treatments were therefore compared separately for high and low covariate scores.

High-Low Analyses. Criterion: Spring 1966 IAE Reading Individual Subtests; Covariate: Fall 1965 IAE GA Total Scores. When comparisons were made on the IAE Vocabulary subtest (Table 12, line 1) among pupils with low pre-test scores, the OAE treatment was found superior to the OAS treatment (p = .006), the NOA treatment (p.=.003), and the "Control" treatment (p=.003). No significant differences were found between the NOA and "Control" treatments or the OAS and "Control" treatments.

Comparisons made on the basis of IAE Comprehension subtests (line 2) revealed that no significant difference was found among any of the treatments.

When comparisons were made on the IAE total test score (line 3) among pupils with low pre-test scores, the OAE treatment was found superior on the OAS treatment (p=.017), the NOA treatment (p=.011), and the "Control" treatment (p=.006). No significant differences were found between the NOA and "Control" treatments or the OAS and "Control" treatments.

TABLE 10

SUMMARY OF ANALYSES OF COVARIANCE ON HIGH AND LOW PRE-TEST SCORES OF BRENGELMAN-MANNING LINGUISTIC CAPACITY INDEX
1965-66 (YEAR TWO) SAMPLE II, GRADE 1
San Antonio Language Research Project

	Criterion Spring 1966	Covariable Fall 1965	NOA vs OAS		NOA vs OAE		OAS vs OAE	
			p	Interp.	p	Interp.	p	Interp.
	LOW PRE-TEST SCORES							
1.	B-M Voc.	B-M Voc	.367	n.s.	.401	n.s.	.032	OAE >OAS
2.	B-M CP	B-M CP	.075	n.s.	.048	NOA >OAE	.842	n.s.
3.	B-M CG	B-M CG	.683	n.s.	.699	n.s.	.898	n.s.
4.	B-M Tot	B-M Tot	.030	NOA>OAS	.369	n.s.	.454	n.s.
	HIGH PRE-TEST SCORES							
5.	B-M Voc.	B-M Voc.	.876	n.s.	.891	n.s.	.871	n.s.
6.	B-M CP	B-M CP	.571	n.s.	.568	n.s.	.992	n.s.
7.	B-M CG	B-M CG	.782	n.s.	.978	n.s.	.797	n.s.
8.	B-M Tot	B-M Tot	.968	n.s.	.947	n.s.	.923	n.s.

n.s.: Not significant

TABLE 11

SUMMARY OF ANALYSES OF COVARIANCE OF INTER-AMERICAN ENGLISH READING TEST 1965-66 (YEAR TWO) SAMPLE II, GRADE 1
San Antonio Language Research Project

Criterion Spring 1966	Covariable Fall 1965	Eq. Slope Hypothesis p	Eq. Slope Hypothesis Interp.	OAS vs CAE	NOA vs "Cont."**	NOA vs OA*	OA* vs "Cont."**
IAE Voc.	IAE GA Total	.041	No	n.a.	n.a.	n.a.	n.a.
IAE Comp.	IAE GA Total	.001	No	n.a.	n.a.	n.a.	n.a.
IAE Total	IAE GA Total	.001	No	n.a.	n.a.	n.a.	n.a.

*OA: Combined CAE and OAS
**"Cont.": "Control"
n.a.: not appropriate

Figure 3

Relationship Between Inter-American English Test (Fall, 1965)
and Inter-American English Test (Spring, 1966)
San Antonio Language Research Project
Sample II, Grade 1

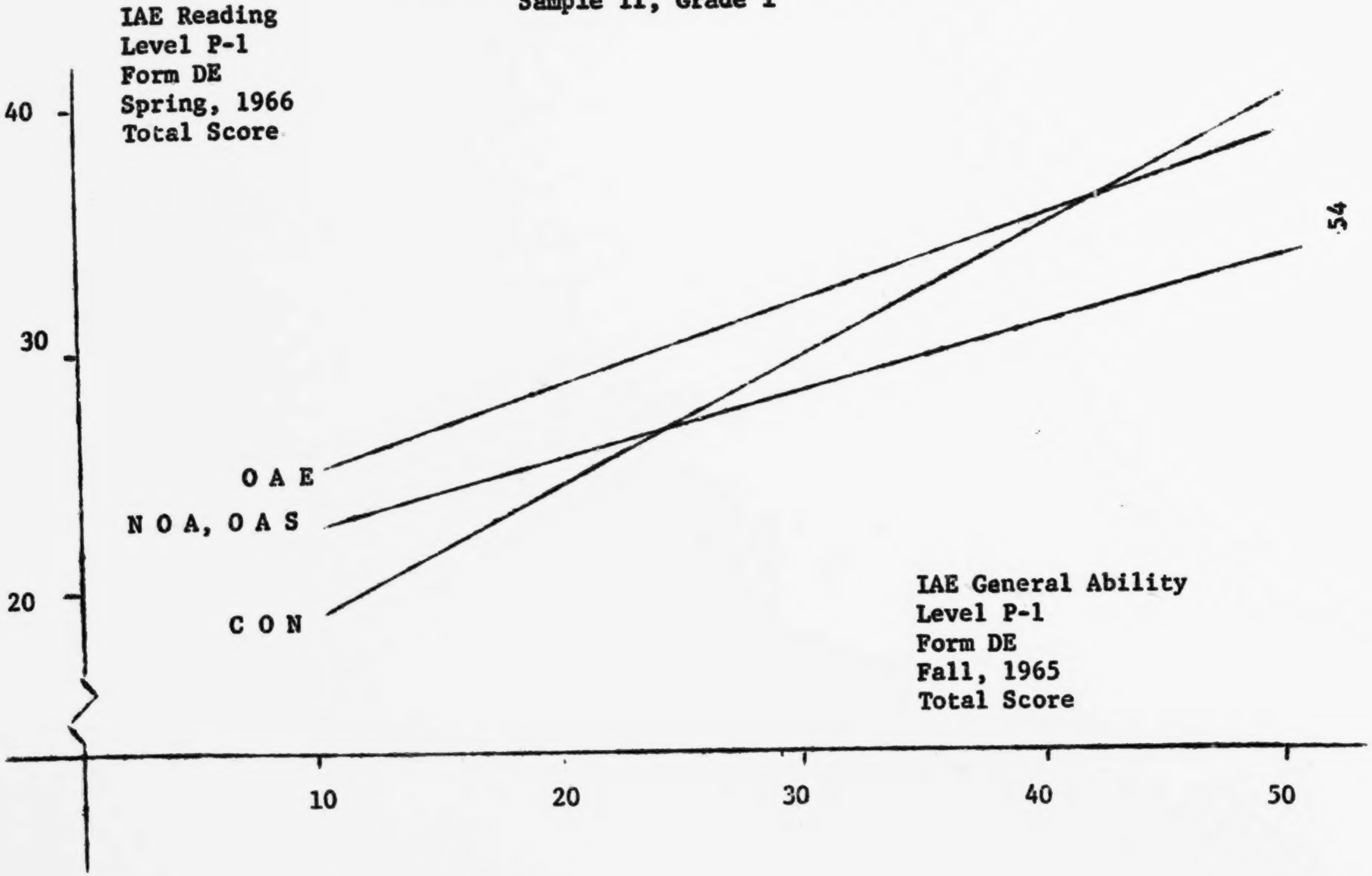


TABLE 12

SUMMARY OF ANALYSES OF COVARIANCE ON HIGH AND LOW PRE-TEST SCORES OF INTER-AMERICAN ENGLISH READING TESTS
1965-66 (YEAR TWO), SAMPLE II, GRADE 1
San Antonio Language Research Project

	Criterion Variable Spring 1966	Covariable Intelligence Fall 1965	NOA vs OAS p	NOA vs OAS Interp.	NOA vs OAE p	NOA vs OAE Interp.	NOA vs "C" p	NOA vs "C" Interp.	OAS vs OAE p	OAS vs OAE Interp.	OAS vs "C" p	OAS vs "C" Interp.	OAE vs "C" p	OAE vs "C" Interp.
	LOW PRE-TEST SCORES													
1.	IAE Vocabulary	IAE GA Total	.859	n.s.	.003	OAE>NOA	.572	n.s.	.006	OAE>OAS	.582	n.s.	.003	OAE>"C"
2.	IAE Comprehension	IAE GA Total	.999	n.s.	.167	n.s.	.514	n.s.	.183	n.s.	.542	n.s.	.061	n.s.
3.	IAE Total	IAE GA Total	.954	n.s.	.011	OAE>NOA	.536	n.s.	.017	OAE>OAS	.508	n.s.	.006	OAE>"C"
	HIGH PRE-TEST SCORES													
4.	IAE Vocabulary	IAE GA Total	.536	n.s.	.106	n.s.	.016	"C">NOA	.522	n.s.	.229	n.s.	.570	n.s.
5.	IAE Comprehension	IAE GA Total	.651	n.s.	.003	OAE>NOA	.001	"C">NOA	.001	OAE>OAS	.001	"C">OAS	.119	n.s.
6.	IAE Total	IAE GA Total	.791	n.s.	.011	OAE>NOA	.001	"C">NOA	.022	OAE>OAS	.002	"C">OAS	.293	n.s.

"C": Control
n.s.: Not significant

TABLE 13

SUMMARY OF ANALYSES OF COVARIANCE OF METROPOLITAN READINESS TESTS
1965-66 (YEAR TWO), SAMPLE II, GRADE 1
San Antonio Language Research Project

	Criterion Spring '66	Covariable Fall '65	Equal Slope Hypothesis		OAS vs OAE		NOA vs "Cont."**		NOA vs CA*		OA* vs "Cont."**	
			p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp
1.	MRT WM	IAE GA Total	.022	No	n.a.		n.a.		n.a.		n.a.	
2.	MRT List	IAE GA Total	.180	Yes	.641	n.s.	.001	"C">NOA	.504	n.s.	.001	"C"> OA
3.	MRT Match	IAE GA Total	.175	Yes	.724	n.s.	.001	"C">NOA	.534	n.s.	.001	"C"> OA
4.	MRT Alph	IAE GA Total	.037	No	n.a.		n.a.		n.a.		n.a.	
5.	MRT Num	IAE GA Total	.859	Yes	.638	n.s.	.999	n.s.	.571	n.s.	.559	n.s.
6.	MRT Cop	IAE GA Total	.063	Yes	.019	OAE>OAS	.001	"C">NOA	.018	NOA>OA	.001	"C"> OA
7.	MRT Total	IAE GA Total	.155	Yes	.018	OAE>OAS	.001	"C">NOA	.060	n.s.	.001	"C">OA

*OA: Combined OAE and OAS
**"Cont.": Control
n.a.: Not appropriate
n.s.: Not significant

TABLE 14

SUMMARY OF ANALYSES OF COVARIANCE OF HIGH AND LOW PRE-TEST SCORES OF THE METROPOLITAN READINESS TESTS, 1965-66 (YEAR TWO), SAMPLE II, GRADE 1
San Antonio Language Research Project

Criterion Variable Spring 1966	Covariable Fall 1965	NOA vs OAS		NOA vs OAE		NOA vs "C"**		OAS vs OAE		OAS vs "C"**		OAE vs "C"**	
		p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.
LOW PRE-TEST SCORES:													
1. MRT Wd. Mean.	IAE GA Total	.855	n.s.	.999	n.s.	.005	"C">NOA	.808	n.s.	.012	"C">OAS	.004	"C">OAE
2. MRT Listening	IAE GA Total	.185	n.s.	.662	n.s.	.001	"C">NOA	.645	n.s.	.001	"C">OAS	.001	"C">OAE
3. MRT Matching	IAE GA Total	.285	n.s.	.582	n.s.	.001	"C">NOA	.701	n.s.	.001	"C">OAS	.001	"C">OAE
4. MRT Alphabet	IAE GA Total	.038	NOA>OAS	.007	OAE>NOA	.071	n.s.	.001	OAE>OAS	.001	"C">OAS	.808	n.s.
5. MRT Numbers	IAE GA Total	.843	n.s.	.592	n.s.	.847	n.s.	.646	n.s.	.852	n.s.	.582	n.s.
6. MRT Copying	IAE GA Total	.004	NOA>OAS	.796	n.s.	.001	"C">NOA	.005	OAE>OAS	.001	"C">OAS	.001	"C">OAE
7. MRT Total	IAE GA Total	.033	NOA>OAS	.597	n.s.	.001	"C">NOA	.003	OAE>OAS	.001	"C">OAS	.001	"C">OAE

**"C": Control
n.s.: Not significant

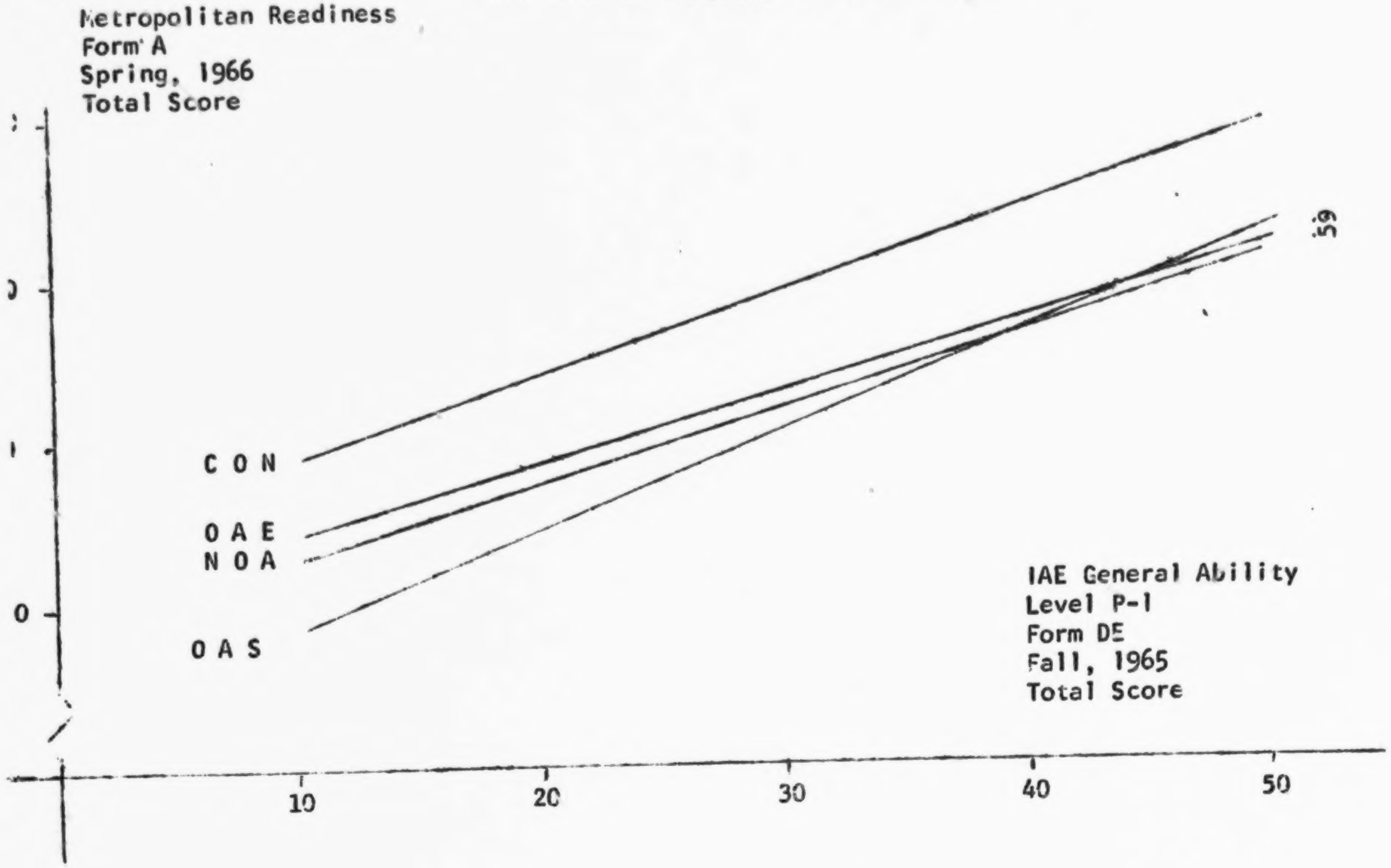
TABLE 14
-PAGE 2-

Criterion Variable Spring 1966	Covariable Fall 1965	NOA vs OAS		NOA vs OAE		NOA vs "C"		OAS vs OAE		OAS vs "C"		OAE VS "C"	
		p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.	p	Interp.
HIGH PRE-TEST SCORES													
8. MRT Wd. Mean.	IAE GA Total	.757	n.s.	.999	n.s.	.001	"C"> NOA	.828	n.s.	.001	"C"> OAS	.001	"C"> OAE
9. MRT Listening	IAE GA Total	.756	n.s.	.999	n.s.	.001	"C"> NOA	.848	n.s.	.001	"C"> OAS	.001	"C">OAE
10. MRT Matching	IAE GA Total	.311	n.s.	.296	n.s.	.013	"C">NOA	.056	n.s.	.584	n.s.	.001	"C">OAE
11. MRT Alphabet	IAE GA Total	.649	n.s.	.514	n.s.	.086	n.s.	.726	n.s.	.988	n.s.	.634	n.s.
12. MRT Numbers	IAE GA Total	.539	n.s.	.233	n.s.	.785	n.s.	.836	n.s.	.561	n.s.	.230	n.s.
13. MRT Copying	IAE GA Total	.875	n.s.	.534	n.s.	.008	"C>NOA	.754	n.s.	.022	"C">OAS	.001	"C">OAE
14. MRT Total	IAE GA Total	.597	n.s.	.754	n.s.	.001	"C">NOA	.574	n.s.	.005	"C">OAS	.001	"C">OAE

"C": Control
n.s.: Not significant

Figure 4

Relationship Between Inter-American English Test (Fall, 1965)
and Metropolitan Readiness Test (Spring, 1966)
San Antonio Language Research Project



When comparisons were made on the IAE Vocabulary subtest (line 4) among pupils with high pre-test scores, no significant differences were found on any comparison except that the "Control" treatment was found to be higher than NOA ($p = .016$).

Comparisons made on the basis of the IAE Comprehension subtest (line 5) revealed that the OAE treatment was superior to the OAS ($p < .001$) and NOA ($p = .003$) treatments; the "Control" treatment was superior to the OAS ($p < .001$) and the NOA ($p < .001$) treatments. No significant differences were found between NOA and OAS treatments or OAE and "Control" treatments. When comparisons were made on the basis of the IAE Total Reading Test scores (line 6), identical results occured.

Criterion: Spring 1966 Metropolitan Readiness Individual Subtests; Covariate: Fall 1965 IAE GA Total Scores. In the analyses (Table 13) involving comparisons based upon the MRT subtests, the Fall 1965 IAE GA served as covariable. Analyses of the Word Meaning subtest (line 1) of the MRT yielded a significant ($p = .022$) treatment-covariate interaction, thereby prohibiting the usual subsequent treatment analyses. Similarly, a significant ($p = .037$) treatment covariate interaction was found for the Alphabet subtest (line 4). Furthermore, no significant differences were found among treatments on the Numbers subtest (line 5).

Analyses of the Listening subtest of the MRT (line 2) revealed the "Control" treatment to be significantly higher than the combined OAE-OAS treatments ($p < .001$) and higher than the NOA treatment ($p < .001$). No significant differences were found between the OAE and OAS treatments or the NOA and combined OAE-OAS treatments.

When the Matching subtest of the MRT (line 3) was the criterion, analyses revealed the "Control" treatment to be higher than the combined OAE-OAS treatments ($p < .001$) and higher than the NOA treatment ($p < .001$). No significant differences were found between the OAE and OAS treatments or the NOA and combined OAE-OAS treatments.

Analyses of the Copying subtest of the MRT (line 6) showed the "Control" treatment to be significantly higher ($p < .001$) than the combined OAE-OAS treatments and significantly higher ($p < .001$) than the NOA treatment. The NOA treatment was found to be significantly higher ($p = .018$) than the combined OAE-OAS treatments. The OAE treatment was found to be significantly higher ($p = .019$) than the OAS treatment.

When the total MRT test score (line 7) was the criterion, analyses revealed the "Control" treatment to be significantly higher ($p < .001$) than the NOA treatment and the

OAE treatment to be significantly higher (p=.018) than the OAS treatment. No significant differences were found between the NOA treatments and the combined OAE-OAS treatments and between the "Control" treatment and the combined OAE-OAS treatments.

Figure 4 provides a graphic illustration of the results of the analyses based upon the MRT total score and the IAE GA total score. Figure 4 may be considered as fairly representative of the subtests as well as the total score.

High-Low Analyses. Criterion: Spring 1966 MRT Individual Subtests; Covariate: Fall 1965 IAE GA Total Scores. When comparisons were made on the MRT Word Meaning subtest (Table 14, line 1) among pupils with low pre-test scores, the "Control" treatment was found to be significantly higher than the OAE (p=.004), OAS (p=.012), and NOA (p=.005) treatments. No significant differences were found among the OAE, OAS, and NOA treatments. When the Listening (line 2) and Matching (line 3) subtests were used as criteria, the findings were essentially the same as those for the Word Meaning subtests (line 1).

Comparisons made on the basis of the MRT Alphabet subtest (line 4) revealed that among pupils with low pre-test scores the "Control" treatment was significantly higher than

OAS ($p < .001$) treatment; no significant differences were found between the "Control" and the OAE or the NOA treatments. The OAE treatment was found to be significantly higher than the OAS ($p < .001$) and the NOA ($p = .007$) treatments. The NOA treatment was significantly higher ($p = .038$) than the OAS.

When comparisons were made on the MRT Numbers subtest (line 5) among pupils with low pre-test scores, no significant differences among treatments were found.

When comparisons were made on the MRT Copying subtest (line 6) among pupils with low pre-test scores, the "Control" treatment was found to be significantly higher than the OAE ($p < .001$), OAS ($p < .001$), and NOA ($p < .001$) treatments. No significant differences were found between the OAE and NOA treatments. The OAS treatment was excelled significantly by the OAE ($p = .005$) and the NOA ($p = .004$) treatments. When the MRT total test (line 7) was used as the criterion, the findings were essentially the same as those for the Copying subtest (line 6).

When comparisons were made on the MRT Word Meaning subtest (line 8) among pupils with low pre-test scores, the "Control" treatment was found to be significantly higher than the OAE ($p < .001$), OAS ($p = .001$) and NOA ($p < .001$) treatments. No significant differences were found among the OAE, OAS, and NOA treatments. When the Listening subtest (line 9) was used as the criterion, the findings were essentially the same as those for the Word Meaning subtest (line 8).

Comparisons made on the basis of the MRT Matching subtest (line 10) revealed that among children with high pre-test scores the "Control" treatment was significantly higher than the OAE ($p < .001$) and the NOA ($p = .013$) treatments. No significant differences were found among the other treatments.

No significant differences were found for children with high pre-test scores when comparisons were made on the MRT Alphabet (line 11) and Numbers (line 12) subtests.

When comparisons were made on the MRT Copying subtest (line 13) among pupils with high pre-test scores, "Control" treatment was found to be significantly higher than the OAE ($p < .001$), OAS ($p = .022$), and NOA ($p = .008$) treatments. No significant differences were found among the other comparisons. When the MRT total test score (line 14) was used as the criterion, the findings were essentially the same as those for the Copying subtest (line 13).

Summary of Year Two Findings

The results of the Sample I (Grade 2) analyses showed a fairly high degree of consistency. The comparisons involving the OAE and OAS groups yielded a significant difference favoring the OAS treatment only when the Metropolitan Word Knowledge subtest was used as criterion. When these groups were compared with the NOA classes, however, significant differences were detected on all criteria, favoring the NOA treatment. The "Control" classes, moreover, were found to excel all of the treatments on almost all the tests.

The Sample II (Grade 1) data yielded a much more complicated picture. There was a marked tendency toward interaction between treatment and covariate. The results seemed to indicate superiority of one treatment for children with low pre-test scores though a different treatment seemed to be favorable for pupils with higher pre-test scores. Furthermore, the comparisons of the treatments were lacking in consistency from one criterion to another.

Since preliminary investigation indicated the frequent presence of interaction, the Sample II (Grade 1) data were analyzed separately for high and low pre-test scores. When comparisons were made at the lower end of the range of pre-test scores and when the criterion was the IAE test, the OAE treatment was found to be superior to all others. When the MRTs were employed as criteria, however, there was a reversal and the "Control" group was found to excel the OAE, although the OAE scores remained generally higher than the OAS. Only on the Alphabet subtest was a significant difference detected between OAE and NOA with the OAE scores being higher. As the foregoing discussion would tend to indicate, the "Control" group surpassed both the NOA and OAS on the Metropolitan tests.

Among children with high pre-test scores, the OAE treatment retained its superiority over the NOA and OAS on the IAE test. Furthermore, in comparison to the "Control" group, the OAE maintained an essentially equal position even at the high end of the pre-test scale. The "Control" group, however, maintained a consistent superiority over the others on the MRTs, regardless of the pre-test score at which comparisons were made.

In summary, then, the results of the Sample I (Grade 2) analyses may be expressed succinctly and accurately by the generalization: "Control" > NOA > OAE = OAS. Among Sample II (Grade 1) children, however, the findings are not so consistent. Generally when the criterion was a measure of reading (IAE), the OAE treatment was found to be superior. With MRT as the criterion, however, the "Control" treatment held the advantage.

CHAPTER IV

SUMMARY, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

Summary

The primary purpose of this study was to determine the effects of oral-aural teaching techniques on pupils' gain in reading proficiency. Sample I (Grade 2) and Sample II (Grade 1) children were subdivided into four groups for each sample for experimental purposes. Children in the first group (OAE) were exposed to the oral-aural teaching methods in English for the presentation of science materials. The second experimental group (OAS) was taught the same science content, and similar oral-aural techniques in Spanish were employed. The same science materials were presented to a third group (NOA), but in this case the oral-aural methods were not used. Finally the "Control" group, representing a cross-section of socio-economic levels, had neither the experimental science materials nor the oral-aural presentation.

Scores were obtained upon each of several measures of reading achievement and intelligence both at the beginning and at the end of the 1965-66 school year. The principal analytic technique was analysis of covariance with post-test scores serving as criterion variables. Pre-test scores were used as covariables, and the categorical variable was experimental treatment.

Among second grade children the OAS and OAE groups were found to be very similar. In almost every case, however, the NOA pupils were found to excel those receiving the oral-aural treatments. The "Control" group, moreover, was generally superior to all others, even NOA. When the first grade data were analyzed, the findings were not nearly so consistent. The OAE group attained the top position on the reading criteria. When the dependent variable was reading readiness, however, the "Control" children obtained the highest scores.

Limitations

Some of the more important limitations which may affect the findings of the study are as follows:

(1) Differences between the OAE and OAS treatments may have been minimized due to lack of available printed materials in Spanish;

(2) A disproportionate number of bilingual teachers were assigned to the Spanish treatment group;

(3) Most, but not all, children in Sample I, (Grade 2) were in the experimental treatment for two years;

(4) School policies and administrative procedures did not always allow effective application of random assignment of pupils to treatments;

(5) The "Control" group used in the study represented a cross-section of the San Antonio school district population in general. It could be anticipated that such factors as socio-economic status, ethnicity, intelligence test scores, and language proficiency would be higher than the disadvantaged experimental groups;

(6) The use of tests administered in English for the samples is questionable. Furthermore, the content validity of standardized tests is suspect in view of the unique content taught.

Conclusions and Recommendations

Based on the second year findings for Sample I (Grade 2) children, it would appear that in terms of improving reading proficiency the experimental treatments involving an extensive oral language component have not shown a particularly beneficial effect. In fact, the evidence indicates that these treatments are less effective in this respect than the NOA and "Control" treatments. This outcome, however, may be a function of other factors than the treatments.

The findings for Sample II (Grade 1) children, however, tend to support a somewhat contradictory conclusion. When reading (IAE Reading Test) was the criterion for comparison, the OAE experimental group excelled the other treatments. When the criterion was reading readiness, however, the "Control" group was found to be superior. It is considered particularly encouraging that the OAE treatment, which was designed specifically for children with little knowledge of English, surpassed the "Control" treatment when the comparison was made for the children with low pre-test scores. It also appears encouraging that the OAE and "Control" groups were found to be essentially equal when the comparisons were made for children with high pre-test scores.

That the oral-aural treatments should be effective for Sample II pupils but ineffective for Sample I seems paradoxical. Horn's findings (1966b) suggest that for Sample I, the oral-aural treatments were not significantly different from the "Control" treatments in the first grade. The same treatments were found to be ineffective for the same sample in the second grade.

The question then is: why does the OAE treatment appear to benefit first grade children in Sample II? There have been no major changes in methods and materials involved in the experimental treatments that would explain the difference between samples. The difference could be explained as difference between the two samples drawn. Attributing the difference to this factor, however, is difficult to accept in view of the similarity in sampling procedures and the fact that both samples were drawn from the same population.

It would appear that a much more reasonable explanation for the unusual results might be in the teacher experience factor. Sample I children assigned to experimental treatments were taught in both first and second grades by teachers who had little or no experience with the experimental methods and materials. Teachers who taught the Sample II children in the first grade were for the most part those who had a full year's experience with the experimental methods and materials. It seems reasonable that the experimental treatments would function more effectively in the hands of experienced teachers. The effect of teacher experience appears a potentially important area for future research.

The current study does not represent a comprehensive evaluation of the experimental program. Additional criteria are necessary in order to accomplish that purpose. The growth in oral language relevant to the experimental treatments has been studied (Ott, 1966). Dramatic growth in oral expressive language appears to be a positive outcome of the experimental treatments. Other aspects such as self-concept and psychosocial development need to be researched. More appropriate measures of cognition, language, and reading directly related to the content of the program need to be developed. The lack of appropriate instrumentation continues to be a major barrier to proper evaluation of the project.

Finally, outside the domain of empirical research and the scope of this study, the staff continues to be frustrated because it is convinced that important behavioral changes are occurring in the children in the experimental treatments which are not currently being measured and quantified in order to be researched. This frustration is increased in magnitude when visiting educators of considerable reputation also recognize the presence of these positive changes. It would appear that with a program as different as the one developed for this project, coupled with a population different from those usually measured, the whole question of appropriate instrumentation of any type needs to be thoroughly examined.

In summary, the present study has not conclusively determined the effects of the experimental program. With respect to gain in reading proficiency, the results appear somewhat contradictory and suggest perhaps the need to await further study before definitive conclusions can be made. It has provided some indications of areas requiring further attention, principally the teacher variable and the development of more appropriate instruments and more comprehensive criteria for evaluation purposes.

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APPENDIX A

SUMMARY OF STATISTICAL PROCEDURES

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Multiple regression procedures (Bottenberg and Ward, 1963) were employed in making the comparisons of treatments. In general form the full model may be expressed as

$$Y = a_1T_1 + a_2T_2 + a_3T_3 + a_4T_4 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + E$$

where

Y = vector of criterion (Spring, 1966) scores;

T_1 = 1 if the corresponding element in Y was earned by an NOA subject; 0 otherwise;

T_2 = 1 if the corresponding element in Y was earned by an OAS subject; 0 otherwise;

T_3 = 1 if the corresponding element in Y was earned by an OAE subject; 0 otherwise;

T_4 = 1 if the corresponding element in Y was earned by a "Control" subject; 0 otherwise;

X_i = (i = 1, 2, 3, 4) = product of the subject's score on the covariate and the element in T_i;

a_i, b_i (i = 1, 2, 3, 4) = regression weights to be computed;

E = vector of residuals.

The test for interaction between treatment and covariable was conducted by imposing the condition of equal slope on the covariate-criterion regression line for all treatments. That is

$$b_1 = b_2 = b_3 = b_4 .$$

This yields the restricted model

$$Y = a_1T_1 + a_2T_2 + a_3T_3 + a_4T_4 + b_1X + E$$

where

$$X = X_1 + X_2 + X_3 + X_4$$

From the squared multiple correlation coefficients yielded by these models the F-distributed statistic

$$\frac{R_1^2 - R_2^2}{1 - R_2^2} \cdot \frac{df_2}{df_1}$$

was computed. When this F-ratio was not statistically significant the group comparisons described on page 23 were conducted.

When the test for interaction yielded a significant F-ratio it was necessary to test for group differences separately at either end of the range of interest. The test was actually performed for covariate scores at about the 15th and 85th percentiles. The treatment groups were analyzed in pairs and their predicted scores equated for the particular covariate score under consideration. The restriction which compels intersection of the regression lines for groups 1 and 2 (NOA and OAS) at the abscissa, u, for example, is

$$a_1 + b_1u = a_2 + b_2u,$$

or

$$a_1 = a_2 + u(b_2 - b_1).$$

Imposed upon the full model, this yields

$$\begin{aligned}
Y &= a_2 + u(b_2-b_1)\ T_1 + a_2T_2 + a_3T_3 + a_4T_4 + b_1X_1 + b_2X_2 \\
&\quad + b_3X_3 + b_4X_4 + E \\
&= a_2T_1 + ub_2T_1 - ub_1T_1 + a_2T_2 + a_3T_3 + a_4T_4 + b_1X_1 \\
&\quad + b_2X_2 + b_3X_3 + b_4X_4 + E \\
&= a_2(T_1 + T_2) + a_3T_3 + a_4T_4 + b_1(X_1 - uT_1) + b_2(X_2 + uT_2) \\
&\quad + b_3X_3 + b_4X_4 + E.
\end{aligned}$$

Similar restrictions were imposed for other comparisons and the F-statistic described above was employed to test the statistical significance of differences in expected values.

APPENDIX B

STATISTICAL RESULTS

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STATISTICAL RESULTS

This appendix presents statistical details of the analyses discussed in Chapter III. The procedures used in testing the hypotheses were adopted from Bottenberg and Ward (1963). A discussion of these procedures is presented in Appendix A.

The data presented here are: (1) the multiple correlation coefficient (squared) for the full model, (2) the squared coefficient for the model obtained under the null hypothesis, (3) the degrees of freedom associated with the F-statistic obtained by comparing the two models, (4) the F-ratio, and (5) the probability of chance occurrance of full model values under the conditions imposed by the null hypothesis.

	R Square Full	R Square Restricted	df	F	P
	PART I:	SAMPLE I	(Grade 2)		
Criterion: IAE Level Covariate: IAE Total					
Interaction	.4396	.4365	3,780	1.43	.232
OAE vs OAS	.4365	.4362	1,783	.39	.540
NOA vs "Control"	.4365	.4339	1,784	3.59	.055
OAE, OAS vs NOA	.4362	.4208	1,784	21.43	.000
OAE, OAS, NOA vs "Control"	.4208	.4201	1,785	.88	.650
Criterion: IAE Speed Covariate: IAE Total					
Interaction	.2996	.2907	3,780	3.32	.019
Criterion: IAE Vocabulary Covariate: IAE Total					
Interaction	.5050	.5017	3,780	1.76	.151
OAE vs OAS	.5017	.5017	1,783	.00	.999
NOA vs "Control"	.5017	.4937	1,784	12.55	.001

	R^2 Full	R^2 Rest.	df	F	P
OAE, OAS vs NOA	.5017	.4942	1,784	11.76	.001
OAE, OAS, NOA vs "Control"	.4942	.4651	1,785	45.10	.000
Criterion: IAE Total					
Covariate: IAE Total					
Interaction	.5358	.5323	3,780	1.93	.122
OAE vs OAS	.5323	.5323	1,783	.05	.817
NOA vs "Control"	.5323	.5319	1,784	.66	.579
OAE, OAS vs NOA	.5323	.5211	1,784	18.76	.000
OAE, OAS, NOA vs "Control"	.5211	.5113	1,785	16.10	.000
Criterion: MAT Word Knowledge					
Covariate: IPAT					
Interaction	.2512	.2510	3,780	.06	.982
OAE vs OAS	.2510	.2471	1,783	4.05	.042
NOA vs "Control"	.2510	.2416	1,784	9.84	.002
OAE, OAS vs NOA	.2471	.2243	1,784	23.78	.000
OAE, OAS, NOA vs "Control"	.2243	.1747	1,785	50.20	.000
Criterion: MAT Word Discrimination					
Covariate: IPAT					
Interaction	.2023	.1988	3,780	1.13	.336
OAE vs OAS	.1988	.1983	1,783	.46	.507
NOA vs "Control"	.1988	.1983	1,784	.46	.507
OAE, OAS vs NOA	.1983	.1763	1,784	21.53	.000
OAE, OAS, NOA vs "Control"	.1763	.1364	1,785	38.00	.000
Criterion: MAT Reading					
Covariate: IPAT					
Interaction	.2840	.2829	3,780	.39	.762
OAE vs OAS	.2829	.2821	1,783	.83	.633
NOA vs "Control"	.2829	.2694	1,784	14.75	.000
OAE, OAS vs NOA	.2821	.2560	1,784	28.52	.000
OAE, OAS, NOA vs "Control".	.2560	.1919	1,785	67.63	.000
Criterion: MAT Total					
Covariate: IPAT					
Interaction	.2772	.2770	3,780	.06	.982

	R^2Full	R^2 Rest.	df	F	P
OAE vs OAS	.2770	.2767	1,783	.39	.540
NOA vs "Control"	.2770	.2654	1,784	12.58	.001
OAE, OAS vs NOA	.2767	.2529	1,784	25.75	.000
OAE, OAS, NOA vs "Control"	.2529	.1964	1,785	59.37	.000
Criterion: MAT Word Knowledge					
Covariate: MAT Word Knowledge					
Interaction	.4085	.4065	2,527	.90	.589
OAE vs OAS	.4065	.3966	1,529	8.75	.004
OAE, OAS vs NOA	.3966	.3727	1,530	21.02	.000
Criterion: MAT Word Discrimination					
Covariate: MAT Word Discrimination					
Interaction	.3784	.3729	2,527	2.35	.094
OAE vs OAS	.3729	.3727	1,529	.10	.747
OAE, OAS vs NOA	.3727	.3562	1,530	13.98	.000
Criterion: MAT Reading					
Covariate: MAT Reading					
Interaction	.3400	.3395	2,527	.17	.849
OAE vs OAS	.3395	.3389	1,529	.48	.503
OAE, OAS vs NOA	.3389	.3034	1,530	28.50	.000
Criterion: MAT Total					
Covariate: MAT Total					
Interaction	.5125	.5106	2,527	1.04	.356
OAE vs OAS	.5106	.5105	1,529	.16	.694
OAE, OAS vs NOA	.5105	.4942	1,530	17.61	.000
Criterion: IAS Level					
Covariate: IAS Total					
Interaction	.0493	.0321	2,527	4.76	.009
Criterion: IAS Speed					
Covariate: IAS Total					
Interaction	.0083	.0047	2,527	.96	.613
Criterion: IAS Vocabulary					
Covariate: IAS Total					
Interaction	.0614	.0485	2,527	3.61	.027

	R^2Full	R^2Rest.	df	F	P
Criterion: IAS Total					
Covariate: IAS Total					
Interaction	.0368	.0258	2,527	3.02	.048

PART II: SAMPLE II (Grade 1)

	R^2Full	R^2Rest.	df	F	P
Criterion: IAS Vocabulary					
Covariate: IAS Total					
Interaction	.0416	.0410	2,446	.14	.871
NOA vs OAS	.0410	.0399	1,448	.48	.502
NOA vs OAE	.0410	.0409	1,448	.02	.883
OAS vs OAE	.0410	.0395	1,448	.69	.589
Criterion: IAS Comprehension					
Covariate: IAS Total					
Interaction	.0105	.0060	2,446	1.00	.500
NOA vs OAS	.0060	.0014	1,448	2.09	.146
NOA vs OAE	.0060	.0060	1,448	.01	.900
OAS vs OAE	.0060	.0018	1,448	1.89	.166
Criterion: IAS Total					
Covariate: IAS Total					
Interaction	.0287	.0285	2,446	.86	.572
NOA vs OAS	.0285	.0253	1,448	1.45	.227
NOA vs OAE	.0285	.0285	1,448	.01	.922
OAS vs OAE	.0285	.0256	1,448	1.32	.249
Criterion: Brengelman-Manning Vocabulary					
Covariate: Brengelman-Manning Vocabulary					
Interaction	.3475	.3239	2,446	8.05	.001
Criterion: Brengelman-Manning Contrastive Phonology					
Covariate: Brengelman-Manning Contrastive Phonology					
Interaction	.2548	.2392	2,446	4.68	.010
Criterion: Brengelman-Manning Contrastive Grammar					
Covariate: Brengelman-					

	R^2Full	R^2Rest.	df	F	P
Manning Contrastive Grammar					
Interaction	.3701	.3686	2,446	.52	.600
OAS vs OAE	.3686	.3677	1,448	.62	.562
OAS, OAE vs NOA	.3677	.3646	1,449	2.23	.132
Criterion: Brengelman-Manning Total					
Covariate: Brengelman-Manning Total					
Interaction	.4915	.4866	2,446	2.13	.118
OAS vs OAE	.4866	.4859	1,448	.63	.566
OAS, OAE vs NOA	.4859	.4823	1,449	3.15	.073
Criterion: IAE Vocabulary					
Covariate: IAE Total					
Interaction	.2800	.2705	3,622	2.76	.041
OAS vs NOA (Low Pre-test)	.2800	.2800	1,622	.03	.859
OAS vs NOA (High Pre-test)	.2800	.2796	1,622	.40	.536
OAE vs NOA (Low Pre-test)	.2800	.2694	1,622	9.19	.003
OAE vs NOA (High Pre-test)	.2800	.2771	1,622	2.55	.106
NOA vs "Control" (Low Pre-test)	.2800	.2796	1,622	.33	.572
NOA vs "Control" (High Pre-test)	.2800	.2734	1,622	5.71	.016
OAS vs OAE (Low Pre-test)	.2800	.2710	1,622	7.80	.006
OAS vs OAE (High Pre-test)	.2800	.2794	1,622	.52	.522
OAS vs "Control" (Low Pre-test)	.2800	.2797	1,622	.31	.582
OAS vs "Control" (High Pre-test)	.2800	.2784	1,622	1.44	.229
OAE vs "Control" (Low Pre-test)	.2800	.2693	1,622	9.24	.003
OAE vs "Control" (High Pre-test)	.2800	.2796	1,622	.34	.570
Criterion: IAE Comprehension					
Covariate: IAE Total					
Interaction	.2449	.2104	3,622	9.46	.000
OAS vs NOA (Low Pre-test)	.2449	.2449	1,622	.00	.999

	R^2Full	R^2Rest.	df	F	P
OAS vs NOA (High Pre-test)	.2449	.2438	1,622	.89	.651
OAE vs NOA (Low Pre-test)	.2449	.2426	1,622	1.89	.167
OAE vs NOA (High Pre-test)	.2449	.2340	1,622	8.96	.003
NOA vs "Control" (Low Pre-test)	.2449	.2442	1,622	.50	.514
NOA vs "Control" (High Pre-test)	.2449	.2151	1,622	24.47	.000
OAS vs OAE (Low Pre-test)	.2449	.2427	1,622	1.75	.183
OAS vs OAE (High Pre-test)	.2449	.2303	1,622	11.97	.001
OAS vs "Control" (Low Pre-test)	.2449	.2444	1,622	.39	.542
OAS vs "Control" (High Pre-test)	.2449	.2149	1,622	24.64	.000
OAE vs "Control" (Low Pre-test)	.2449	.2407	1,622	3.42	.061
CAE vs "Control" (High Pre-test)	.2449	.2419	1,622	2.39	.119
Criterion: IAE Total Covariate: IAE Total					
Interaction	.2947	.2757	3,622	5.60	.001
OAS vs NOA (Low Pre-test)	.2947	.2947	1,622	.00	.954
OAS vs NOA (High Pre-test)	.2947	.2946	1,622	.07	.791
OAE vs NOA (Low Pre-test)	.2947	.2874	1,622	6.41	.011
OAE vs NOA (High Pre-test)	.2947	.2875	1,622	6.39	.011
NOA vs "Control" (Low Pre-test)	.2947	.2941	1,622	.55	.536
NOA vs "Control" (High Pre-test)	.2947	.2773	1,622	15.37	.000
OAS vs OAE (Low Pre-test)	.2947	.2883	1,622	5.60	.017
OAS vs OAE (High Pre-test)	.2947	.2888	1,622	5.18	.022
OAS vs "Control" (Low Pre-test)	.2947	.2942	1,622	.45	.508
OAS vs "Control" (High Pre-test)	.2947	.2025	1,622	10.80	.002

	R^2Full	R^2Rest.	df	F	P
OAE vs "Control" (Low Pre-test)	.2947	.2858	1,622	7.83	.006
OAE vs "Control" (High Pre-test)	.2947	.2934	1,622	1.11	.293
Criterion: MRT Word Meaning					
Covariate: IAE Total					
Interaction	.2053	.1930	3,622	3.21	.022
OAS vs NOA (Low Pre-test)	.2053	.2052	1,622	.03	.855
OAS vs NOA (High Pre-test)	.2053	.2051	1,622	.09	.757
OAE vs NOA (Low Pre-test)	.2053	.2053	1,622	.00	.999
OAE vs NOA (High Pre-test)	.2053	.2053	1,622	.00	.999
NOA vs "Control" (Low Pre-test)	.2053	.1948	1,622	8.15	.005
NOA vs "Control" (High Pre-test)	.2053	.1607	1,622	34.85	.000
OAS vs OAE (Low Pre-test)	.2053	.2052	1,622	.06	.808
OAS vs OAE (High Pre-test)	.2053	.2052	1,622	.04	.828
OAS vs "Control" (Low Pre-test)	.2053	.1972	1,622	6.27	.012
OAS vs "Control" (High Pre-test)	.2053	.1742	1,622	24.32	.000
OAE vs "Control" (Low Pre-test)	.2053	.1940	1,622	8.81	.004
OAE vs "Control" (High Pre-test)	.2053	.1562	1,622	38.41	.000
Criterion: MRT Listening					
Covariate: IAE Total					
Interaction	.3321	.3269	3,622	1.63	.180
OAS vs NOA (Low Pre-test)	.3321	.3302	1,622	1.74	.185
OAS vs NOA (High Pre-test)	.3321	.3320	1,622	.10	.756
OAE vs NOA (Low Pre-test)	.3321	.3311	1,622	.93	.662
OAE vs NOA (High Pre-test)	.3321	.3321	1,622	.00	.999

	R²Full	R²Rest.	df	F	P
NOA vs "Control" (Low Pre-test)	.3321	.3182	1,622	12.94	.001
NOA vs "Control" (High Pre-test)	.3321	.2910	1,622	38.31	.000
OAS vs OAE (Low Pre-test)	.3321	.3319	1,622	.22	.645
OAS vs OAE (High Pre-test)	.3321	.3321	1,622	.03	.848
OAS vs "Control" (Low Pre-test)	.3321	.3103	1,622	20.34	.000
OAS vs "Control" (High pre-test)	.3321	.3031	1,622	27.02	.000
OAE vs "Control" (Low Pre-test)	.3321	.3104	1,622	20.24	.000
OAE vs "Control" (High Pre-test)	.3321	.2862	1,622	42.79	.000
Criterion: MRT Matching					
Covariate: IAE Total					
Interaction	.2687	.2629	3,622	1.65	.175
OAS vs NOA (Low Pre-test)	.2687	.2674	1,622	1.15	.285
OAS vs NOA (High Pre-test)	.2687	.2675	1,622	1.03	.311
OAE vs NOA (Low Pre-test)	.2687	.2679	1,622	.67	.582
OAE vs NOA (High Pre-test)	.2687	.2674	1,622	1.09	.296
NOA vs "Control" (Low Pre-test)	.2687	.2554	1,622	11.34	.001
NOA vs "Control" (High Pre-test)	.2687	.2615	1,622	6.12	.013
OAS vs OAE (Low Pre-test)	.2687	.2685	1,622	.15	.701
OAS vs OAE (High Pre-test)	.2687	.2645	1,622	3.57	.056
OAS vs "Control" (Low Pre-test)	.2687	.2491	1,622	16.65	.000
OAS vs "Control" (High Pre-test)	.2687	.2679	1,622	.68	.584
OAE vs "Control" (Low Pre-test)	.2687	.2486	1,622	17.07	.000
OAE vs "Control" (High Pre-test)	.2687	.2513	1,622	14.77	.000

	R^2Full	R^2Rest.	df	F	P
Criterion: MRT Alphabet Covariate: IAE Total					
Interaction	.2582	.2481	3,622	2.84	.037
OAS vs NOA (Low Pre-test)	.2582	.2532	1,622	4.21	.038
OAS vs NOA (High Pre-test)	.2582	.2572	1,622	.88	.649
OAE vs NOA (Low Pre-test)	.2582	.2495	1,622	7.33	.007
OAE vs NOA (High Pre-test)	.2582	.2577	1,622	.44	.514
NOA vs "Control" (Low Pre-test)	.2582	.2544	1,622	3.19	.071
NOA vs "Control" (High Pre-test)	.2582	.2548	1,622	2.89	.086
OAS vs OAE (Low Pre-test)	.2582	.2323	1,622	21.70	.000
OAS vs OAE (High Pre-test)	.2582	.2581	1,622	.12	.726
OAS vs "Control" (Low Pre-test)	.2582	.2441	1,622	11.81	.001
OAS vs "Control" (High Pre-test)	.2582	.2582	1,622	.00	.988
OAE vs "Control" (Low Pre-test)	.2582	.2582	1,622	.06	.808
OAE vs "Control" (High Pre-test)	.2582	.2572	1,622	.83	.636
Criterion: MRT Numbers Covariate: IAE Total					
Interaction	.1736	.1726	3,622	.26	.859
OAS vs NOA (Low Pre-test)	.1736	.1735	1,622	.04	.843
OAS vs NOA (High Pre-test)	.1736	.1728	1,622	.56	.539
OAE vs NOA (Low Pre-test)	.1736	.1726	1,622	.70	.592
OAE vs NOA (High Pre-test)	.1736	.1717	1,622	1.41	.233
NOA vs "Control" (Low Pre-test)	.1736	.1735	1,622	.03	.847
NOA vs "Control" (High Pre-test)	.1736	.1735	1,622	.07	.785
OAS vs OAE (Low Pre-test)	.1736	.1724	1,622	.87	.646
OAS vs OAE (High Pre-test)	.1736	.1735	1,622	.04	.836

	R^2Full	R^2Rest.	df	F	P
OAS vs "Control" (Low Pre-test)	.1736	.1735	1,622	.03	.852
OAS vs "Control" (High Pre-test)	.1736	.1731	1,622	.35	.561
OAE vs "Control" (Low Pre-test)	.1736	.1732	1,622	.32	.582
OAE vs "Control" (High Pre-test)	.1736	.1717	1,622	1.43	.230
Criterion: MRT Copying					
Covariate: IAE Total					
Interaction	.1805	.1709	3,622	2.43	.063
OAS vs NOA (Low Pre-test)	.1805	.1691	1,622	8.61	.004
OAS vs NOA (High Pre-test)	.1805	.1804	1,622	.02	.875
OAE vs NOA (Low Pre-test)	.1805	.1804	1,622	.06	.796
OAE vs NOA (High Pre-test)	.1805	.1799	1,622	.40	.534
NOA vs "Control" (Low Pre-test)	.1805	.1523	1,622	21.41	.000
NOA vs "Control" (High Pre-test)	.1805	.1712	1,622	7.05	.008
OAS vs OAE (Low Pre-test)	.1805	.1700	1,622	7.92	.005
OAS vs OAE (High Pre-test)	.1805	.1803	1,622	.10	.754
OAS vs "Control" (Low Pre-test)	.1805	.1188	1,622	46.79	.000
OAS vs "Control" (High Pre-test)	.1805	.1736	1,622	5.18	.022
OAE vs "Control" (Low Pre-test)	.1805	.1474	1,622	25.08	.000
OAE vs "Control" (High Pre-test)	.1805	.1639	1,622	12.60	.001
Criterion: MRT Total					
Covariate: IAE Total					
Interaction	.4657	.4612	3,622	1.75	.155
OAS vs NOA (Low Pre-test)	.4657	.4619	1,622	4.46	.033

	R^2Full	R^2Rest.	df	F	P
OAS vs NOA (High Pre-test)	.4657	.4651	1,622	.71	.597
OAE vs NOA (Low Pre-test)	.4657	.4651	1,622	.71	.597
OAE vs NOA (High Pre-test)	.4657	.4656	1,622	.10	.754
NOA vs "Control" (Low Pre-test)	.4657	.4507	1,622	17.44	.000
NOA vs "Control" (High Pre-test)	.4657	.4456	1,622	23.42	.000
OAS vs OAE (Low Pre-test)	.4657	.4581	1,622	8.86	.003
OAS vs OAE (High Pre-test)	.4657	.4654	1,622	.33	.574
OAS vs "Control" (Low Pre-test)	.4657	.4376	1,622	32.72	.000
OAS vs "Control" (High Pre-test)	.4657	.4587	1,622	8.22	.005
OAE vs "Control" (Low Pre-test)	.4657	.4543	1,622	13.27	.001
OAE vs "Control" (High Pre-test)	.4657	.4471	1,622	21.66	.000

APPENDIX C

INFORMATION CONCERNING THE LANGUAGE RESEARCH PROJECT

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INFORMATION CONCERNING THE LANGUAGE RESEARCH PROJECT
THOMAS D. HORN, DIRECTOR

THE UNIVERSITY OF TEXAS AT AUSTIN AND
THE SAN ANTONIO INDEPENDENT SCHOOL DISTRICT

The following materials can be obtained by writing to Dr. Richard D. Arnold, Assistant Director, Language Research Project, 222C Wooldridge Hall, The University of Texas, Austin, Texas 78705.

Language Unlimited, 16mm. black and white film, $65.00 plus postage.

Arnold, Richard D., 1965-66 (Year Two) Findings, San Antonio Language Research Project, Thomas D. Horn, Director, Austin: The University of Texas, 1968. $2.50 plus postage.

Horn, Thomas D., A Study of the Effects of Intensive Oral-Aural Spanish Language Instruction, Oral-Aural English Language Instruction and Non-Oral-Aural Instruction on Reading Readiness in Grade One. Austin: The University of Texas, 1966. $2.50 plus postage. Out of print.

Jameson, Gloria Ruth, The Development of a Phonemic Analysis for an Oral English Proficiency Test for Spanish-Speaking School Beginners. Austin: The University of Texas, 1967. $2.50 plus postage.

MacMillan, Robert W., A Study of the Effect of Socioeconomic Factor on the School Achievement of Spanish-Speaking School Beginners. Austin: The University of Texas, 1966. $2.50 plus postage.

McDowell, Neil A., A Study of the Academic Capabilities and Achievements of Three Ethnic Groups: Anglo, Negro, and Spanish Surnam in San Antonio, Texas. Austin: The University of Texas , 1966 $2.50 plus postage.

Ott, Elizabeth H., A Study of Levels of Fluency and Proficiency in Oral English of Spanish-Speaking School Beginners. Austin: The University of Texas, 1967. $2.50 plus postage.

Pena, Albar A., A Comparative Study of Selected Snytactical Structures of the Oral Language Status in Spanish and English of Disadvantaged First-Grade Spanish-Speaking Children. Austin: The University of Texas, 1967. $2.50 plus postage.

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McDowell, Neil A. A Study of the Academic Capabilities and Achievements of Three Ethnic Groups: Anglo, Negro, and Spanish Surname in San Antonio, Texas. Austin: The University of Texas, 1966.

Texas Education Agency. The Preschool Instructional Program for Non-English Speaking Children. Austin: Texas Education Agency, October, 1962